The Electrical Review

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Raising the Standard

MR. H. C. HAZEL, the whole-time inspector appointed last March by the National Register of Electrical Installation Contractors, is to be congratulated on the firstfruits of his labours. He has not only displayed great energy in examining new installations but has created an atmosphere at once healthy and helpful among registered contractors.

Judging from correspondence received at the Register's headquarters, contractors regard the inspector in the light of a technical adviser rather than as someone primarily concerned to discover their faults. This is as it should be, for lack of knowledge of the best practice (as exemplified in the I.E.E. Wiring rules) and inadequate supervision are evidently the most frequent causes of the lapses reported.

The report mentions a dozen types of definite breaches of the accepted rules that have been discovered. These may be roughly classified under two main heads: insufficient protection of wiring and inadequate earthing. The use of unprotected cable in roofs and floors cannot surely be ascribed merely to ignorance; it is a crime against common sense. Similar irresponsibility is shown in the failure to connect the earthing pins of three-pin plugs, which were obviously intended to serve some purpose.

Broken continuity in conduit or cable sheathing should be revealed if proper tests are taken, but only careful workmanship and supervision can prevent high-resistance continuity. A third type of fault that is all too common is the insertion of circuit switches on the neutral side; very elementary tests would obviate this happening.

Intentions generally appear to be good, but if adverse criticism can be levelled at the work of contractors who may be regarded as the elect what can be said about those who are not of the fold?

To have only one inspector among over 1,600 contractors is little short of ridiculous, even though the moral effect of his existence may be considerable, and the decision to appoint a second inspector to enable the work of candidates for registration to be properly investigated is a step in the right direction.

The new regulations of the Electricity Commissioners give supply undertakings greater powers to refuse connection of unsatisfactory new installations and to disconnect old ones. This is a far-reaching provision, and we suggest to the insurance authorities that they should, to begin with, inspect and report on all installations put in more than twenty years ago. Do we presume too much if we prophesy much work for contractors as the result?

Electrical Retail Trading

MR. GORDON SELFRIDGE has his eye on the electrical industry. Many other big retailing men in London and the provinces are equally interested. It is their purpose in life to make money out of the sale of goods to the public, and they have store and showroom facilities which enable them to reach "the common people," all barriers down. As specially large buyers they will be in a position to secure special terms from British manufacturers under the "Fair Trading Policy." The Electrical Wholesalers, who invited Mr. Selfridge to speak at their annual dinner last week, are themselves distributors, and they must be fully alive to the importance of the developing electrical retailing position. Their guest hinted that however great the electrical industry might be, it would find it profitable to use the services of merchandisers to *sell* its products. Whatever points of criticism may occur to some minds, it is obvious that everybody who can swell the turnover of electrical goods among the people will advance the cause of domestic and general electrification. The idea that the sale of electrical goods is quite a legitimate activity for the house furnisher, the decorator and the ironmonger is, of course, not new, though it has not been popular. The practice is growing everywhere. It is the business of

the industry to deliver the goods without let or hindrance, and to give every reasonable facility for their distribution.

The Fair

THINGS are very encouraging at the Birmingham electrical section of the British Industries Fair this year, and we strongly urge all electrical men to pay a visit. Removal of the section from the corner at the far end is an excellent improvement which has received general approval, and that, together with the more open layout, has created a better atmosphere. There is also a considerable increase in the number of exhibitors, and many of them have enlarged and improved their stands, so that there is now a really first-class setting for conducting business. To get a true perspective of the electrical position, however, it is not sufficient to see only the electrical section at Birmingham. For example, with only one exception, we saw all the convectors referred to in our review this week outside the section. There is also much of the lighter equipment, both domestic and industrial, at Olympia. It is a pity that the non-domestic side of the industry is not better represented, for, with the exception of the I.M.E.A. exhibition, which is almost wholly domestic, the B.I.F. is the only annual national opportunity for the electrical industry.

1934 Makes a Good Start

CHEERFUL reading is provided on another page of this issue by an analysis of the Board of Trade returns for January. Substantial advances are recorded in the value of both electrical imports and exports, the latter showing an increase of over 27 per cent. on the 1933 figure. Of particular encouragement is the increased activity in the electrical machinery market, which has been one of the branches of the industry most heavily hit by the general depression. A new feature of the statistics, namely, the publication of figures showing the destination of several classes of exports, will be useful to manufacturers seeking opportunities for the development of their electrical export trade.

The Southern Electric

THE best showing among the Home Railways during the past few years has been made by the Southern Railway. Whether this has been due directly to the extensive electrification of the company's lines or to the great expansion of population in the areas which it serves is beside the point. Without the facilities which electrification has provided the company could hardly have coped with its increased traffic. The amount of shunting which would have become necessary with steam locomotives at the London termini would have rendered its position extremely difficult. Now, of course, electric trains run in and out efficiently (and cleanly), saving an enormous amount of time and labour. The company's report for 1933 shows that over a third of its engine miles are now electric, and that while the steam mileage declined, electric traction increased by 20 per cent. Apparently the financial results are satisfactory, for the dividend on the preferred ordinary stock is raised from 1 to 3 per cent. We may yet live to see the Southern all-electric.

That Blessed Word!

WE sympathise with Sir William Ray in having to attend so many electrical functions and deliver so many addresses on electricity development at a time when his thoughts are necessarily elsewhere. He has a very full engagement list in connection with the London County Council election campaign, so we cannot expect him to contribute much beyond his personality to electrical affairs until the time mentioned by him when he shouldered the burden of the E.D.A. directorship. We cannot reasonably expect any marked originality of ideas until he has had sufficient opportunity to study the complexities of the whole electrical position. At the annual dinner of the Association of Supervising Electrical Engineers he spoke of the "inevitability" of the progress of electricity, which we have heard of before, but when he said that all that was wanted was "good will and co-operation" we began to calculate on how many occasions we had heard "from other lips and other tongues" these blessed words used to describe how we could reach the real solution for all the troubles of our poor little industry. The "inevitability" will only be accelerated in its rate of approach through hard work on the part of everybody, and advance planning such as Sir John Brooke advocated. That should not be beyond our powers, in spite of all our past conferences, discussions and disappointments.

Sir Thomas Callender and the Y.E.P.

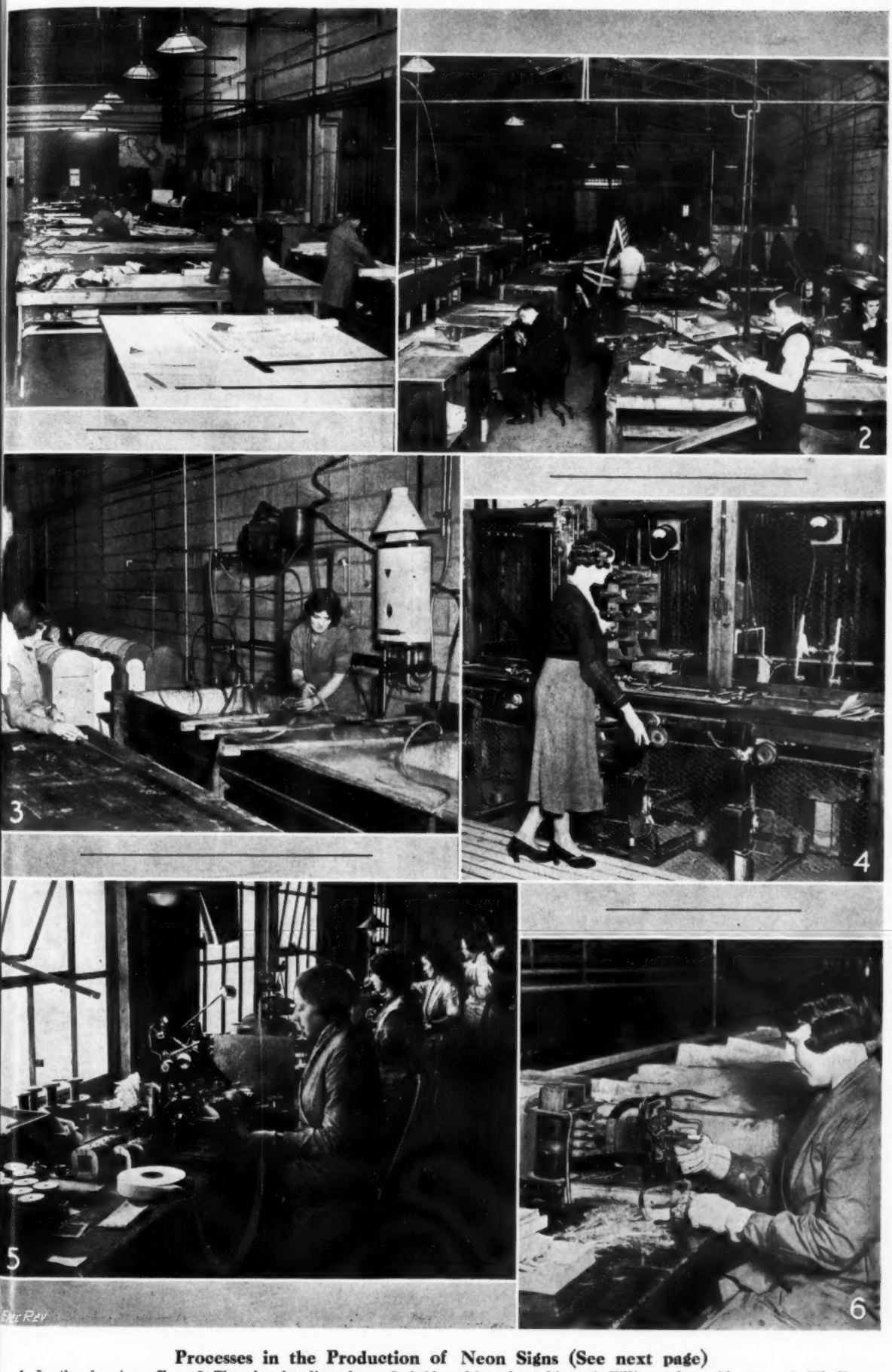
THE retirement of Sir T. O. Callender from the board of the Yorkshire Electric Power Company is an event of more than ordinary interest. It is just over thirty years ago since that company, in very different days from these, began its pioneering operations amidst great difficulties, and during the whole of that period Sir Thomas has been a director. Acting under medical advice following upon a protracted and severe illness, he has now decided to let some things go. He is, happily, able to do so when the Yorkshire concern has reached a very prosperous position, which it is likely to maintain and improve.

In the North-Met. Area

FEW electricity supply concerns can find themselves so overwhelmed with the greatness of their opportunities as the North Metropolitan Electric Supply Company. When one bears in mind the nature of its area, the new building developments that are proceeding in many parts of it, and the almost unavoidable business that will come its way during the next few years, the story of a year's progress is really not a matter of surprise. What would be surprising would be a failure to reap almost automatically a great harvest. These thoughts are not intended to convey any idea that the company is not displaying enterprise adequate to the opportunity, but they ought to be remembered when we review the very remarkable figures that appear in the directors' report. We can imagine the feelings of undertakings which long for more fertile areas in which to display the much-called-for enterprise, as they read what the North-Met. is doing. Its capital expenditure last year was £874,898; it laid 171 miles of underground mains and erected 25 miles of overhead lines. It sold nearly 54 millions more units than in 1932 and connected 32,900 new consumers, and the net revenue increased from £616,000 to £685,000.

The Water-heating Load

A CONTINUOUS supply of hot water for domestic uses is regarded as one of the greatest boons that electricity can provide. The water-heating load yields a larger return per pound of expenditure to the supply undertaking than any other, as Mr. S. F. Osborne shows on a later page. We think the author is optimistic in expecting that a large amount of the load can be obtained at 0.75d. per kWh. This price would compare favourably with gas at 10d. per therm, but the chief competitors are the kitchen range and the coke stove. The latter will provide hot water at a considerably lower price than the equivalent of 0.75d. per kWh. Even though it will not maintain an approximately constant temperature at all times, requires stoking and cleaning out, takes up space for fuel storage, and in warm weather makes the house insufferably hot, nevertheless there are many potential consumers who would have to put up with this, simply because they could not afford the additional cost of electricity. Several undertakings find it necessary to come down to 0.33d. per kWh for this service, and we doubt whether much will be done above 0.4d.



Processes in the Production of Neon Signs (See next page)

1. In the drawing office. 2. The glass-bending shop. 3. Acid-washing the tubing. 4. Filling tubes with gas. 5. Winding transformer coils. 6. Spot-welding the leading-in wires to the electrodes

NEON SIGN PRODUCTION

CONSIDERING the prominent part that neon tubes play in modern advertising, the available literature regarding them is scanty. We know of only one text book dealing with the subject, *viz.*, "Neon Tube Practice" by W. L. Schallreuter (Blandford Press, 10s. 6d.), which was reviewed in our issue of September 15th, 1933. Apart from this, articles appeared in the ELECTRICAL REVIEW of August 21st and November 15th, 1931, and April 22nd, 1932, and a few papers have been read before technical societies, notable among which was one by Mr. C. C. Paterson on the wider subject of luminous discharge-tube lighting, which was given in November, 1932, before the Illuminating Engineering Society. The present article, we believe, is the first to be published relating to modern processes of manufacture.

A glass bender at work

Individual Design and Manufacture

The first thing that struck us on visiting the works of Claude-General Neon Lights, Ltd., at Wembley Hill, was the large proportion of space allotted to draughtsmen. With the exception of window and box signs, every neon display has to be individually designed and manufactured. Except for details, such as electrodes, which are manufactured for stock, the economies of mass production can rarely be obtained. The point is worth stressing, for obviously the amount of special designing and manufacture has a considerable bearing on subsequent costs.

From head office comes a scale drawing of the sign to be, as approved by the customer. Then at the works a scale drawing of the elevation of the building has to be prepared, showing the position of the sign in relation to the architectural details. These drawings are needed for submission to the architects, surveyors and local authorities concerned. They also are indispensable for the erection staff when the sign is ready to be placed in position. Full-size drawings are then made from the scale originals, showing every detail of the sign, and in particular the exact position of the tubes (which often have to be bent back on themselves in intricate shapes) and the parts blacked out. Prints are run of these full-size drawings and supplied to the various departments concerned, *e.g.*, to the glass blowers, who obtain an exact reproduction of the design by registering the hot tube with it from time to time and to the metal-workers and wood-workers who make the backgrounds for the tubes.

From this point the work can be divided into three parts. The first is the manufacture of the luminescent tubes, the second the preparation of the background on which the tubes are to be placed, and the last the electrical equipment needed to supply the tubes with the form of current which they need.

Preparing the Tubes

The tube is taken from stock in the straight, and is first washed in dilute hydrofluoric acid, tap water and distilled water in turn, and then dried by compressed air. The tube then passes to the glass blower. Lengths are cut off by a pair of pliers, holding a single turn of resistance wire; the tube is passed through the noose formed by the wire and cut through by its heat almost as soon as the pressing of the handle of the pliers has switched on the current. When the tube has been bent to shape on the full-sized drawing, the bends are examined in an instrument that uses the polarisation of light to show up any fault in annealing, bright colours indicating a state of strain. It is then washed again as before.

The next stage is to weld on the tube ends (complete with capped electrode) taken from stock; the manufacture of these is dealt with later. The tube is then connected to a high-vacuum system and the air exhausted while a current at high voltage is passed through. This process heats the tube and removes any trace of impurity or moisture which may be occluded in the glass or in the electrodes. The extreme care taken at every stage to ensure cleanliness is of the utmost importance as regards the useful life of the tube.

Gas Filling

The pumps are turned off, and one of the rare gases admitted from a glass cylinder connected to the vacuum system. To get the gas out of the container into the tube without loss, an outer tube, surrounded by a solenoid coil, is fused to the container. The pip of the container is broken by the percussion of a weight actuated by the solenoid. The process of admitting and exhausting gas is repeated until the milliampères passed at a high voltage drop to a steady value, indicating a a state of complete purity. A mercury gauge indicates the correct pressure of the final filling of gas.

After pumping, the tubes are "aged" by being subjected for a considerable period to a voltage higher than that at which they are to be operated. The gas is thus brought to a stable condition, and any chance of premature failure is minimised. In view of the high voltage employed, all ageing bay and pumping bench doors are electrically interlocked so as to prevent ingress when conductors are charged. A new bay, to be devoted exclusively to service repairs, is now nearing completion.

Cutting off the correct length of tubing

The electrode itself is made of sand-blasted sheet iron, purified in the works and spot-welded into a cylindrical form.

The connection to the supply is made by wires which, as in filament-lamp manufacture, have the same coefficient of expansion as the glass in which they are embedded. They are spot-welded to the electrode.

An automatic rotary machine with six triple Bunsen burners, similar to those employed in lamp manufacture, seals the electrode and lead-in wires in the glass tube end; a vacuum pump removes air and moisture, so that the electrodes can be stored indefinitely without fear of deterioration. Before use, brass end caps are cement-baked on to the glass tube in a neat little set of electric resistance ovens; there are ten of these ovens in series of 240 V.

The tubes are mounted in a great variety of manners, *e.g.*, on letters of cellulosed metal, stainless steel, and teak (for its weather and fire-resisting properties), on panels of metal, plymax and teak and in box signs. Different shops are allocated to the working of wood and metal, to the spraying of cellulose, gilding and sign-painting. The metal letters are of lead-coated, rolled terne plate. In the wood-working shop, the wobble saw which shapes the teak is fitted with an unobtrusive compressed air jet which quietly blows the sawdust away from the machinist.

Electrical Equipment

The voltage required for cold-cathode tubes varies normally between 1,000 and 5,000, being proportionate to the length of tube, plus the electrode drop. The striking voltage, however, is about twice the running voltage. The transformers used for changing the supply voltage have therefore to fulfil a double purpose: they must step up the voltage to that required for striking and yet provide a means of preventing the current rising above the correct value needed thereafter, even up to catastrophic values, since Ohm's law is not followed, and the volt drop (made up of the cathode fall and a uniform drop over the luminous column) decreases as the current increases.

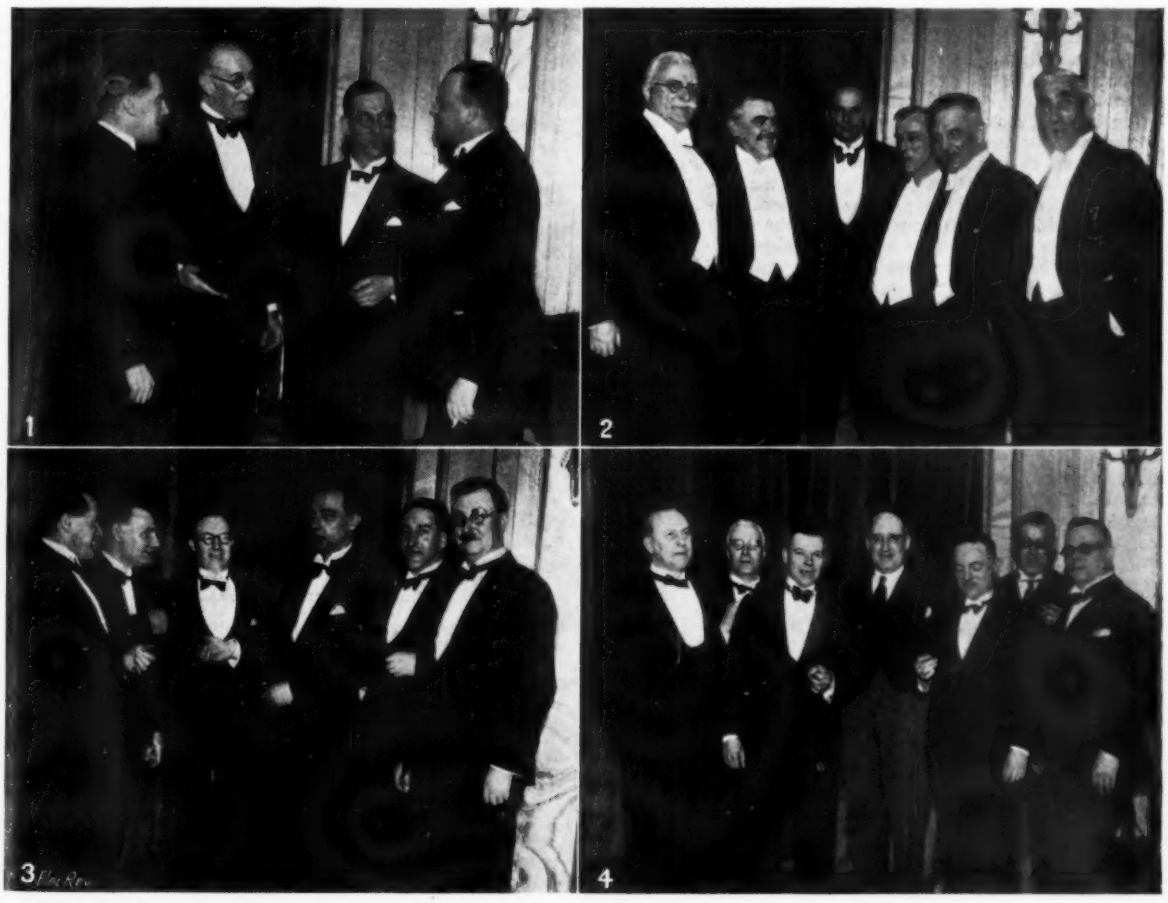
The transformers used are of the stray-field type, with one primary and two secondary coils. Thin strips of iron are inserted in the space between the primary and the secondary coils. The transformer thus has a high reactance value, the magnetic leakage obviating the need for an external choke. Its value can be accurately adjusted to the current needed by altering the relative position of the iron strips. The transformers, bitumen covered, are mounted in iron cases, and the centre point of the secondaries is connected to the casing, so that the potential to earth at the terminals is only half of the full amount.

As a tube "hardens" after a certain length of time it demands a higher striking voltage than that originally provided; to care for this, a tapping on the primary side is brought out to a third terminal, which enables the voltage to be increased by about 10 per cent. If necessary to prevent radio interference, a suitable choke can be fitted to the centre point of the secondary, which is at zero potential. Transformers up to 2,500 V are usually made for an output of 0.25 kVA, and up to 5,000 V for 0.5 and 1 kVA output. The primary side is made up of enamelled wire covered by one layer of cotton, and the secondaries of enamelled wire with a waxed-paper separation between each layer.

A bank of automatic winding machines makes quick work of the building up of the coils; a 0.25 kVA secondary having 14,000 turns, 100 to each layer, is finished by a girl in a few minutes. As the mean power factor of cold-cathode tubes is only about 0.37, correction by means of condensers has in some cases to be effected. The wave form is, however, so peculiar that connection can commercially be made only to 0.8, a figure acceptable to supply authorities.

Transformer and tubes are tested together on a bench provided with facilities for reproducing the characteristics of the supply on which the sign is to operate, the various parts are collated and checked, and the neon display is ready for packing. The well-known "Cleon" window sign, a new and economical type of box-sign, and the "Sunlight" tubing used to illuminate the chief engineer's office, particularly impressed us.

We are indebted to Captain Higgins, B.Sc., A.M.I.E.E., the company's chief engineer, and his staff for taking us round the works and demonstrating the different processes.



At the Annual Dinner of the Association of Supervising Electrical Engineers **(See page 289)**

From left to right: 1. Messrs. L. W. Medcalf, F. W. Smith, J. Munro and L. A. Booth. 2. A group of past-presidents, Messrs. A. M. Sillar, A. H. Dykes, W. J. Revell (former hon. secretary), G. Scott Ram, W. E. Highfield and F. Gill. 3. Messrs. T. W. Whetton, G. Jelley, A. Brammer (general secretary), E. J. Shuter, H. A. Crabtree, and B. C. Garman. 4. Messrs. A. O. Rixon, J. W. Brooks, W. J. Cranmer, G. C. Macpherson, W. G. Page, E. H. Wratten, and W. Herbert

Domestic Water Heating. By S. F. Osborne

THE value of a load to supply undertakings depends mainly upon three things: (1) The cost of obtaining it; (2) the cost of supplying it: and (3) the selling price per kWh. In this article I propose to compare each of the above items as they are related to the water-heating load with similar factors in other domestic loads, to show to what extent items (1) and (2) are lower, and to prove that, though the price obtained per kWh is less, the value of this load to undertakings is greater than most other domestic loads.

Item (1) can be dealt with under two headings: (a) the load obtained per unit of expenditure on (i) advertising, (ii) propaganda, (iii) salesmanship, and (b) the expenditure on the installation and maintenance of apparatus for a given revenue. Considering the first of the three items under (a) a comparison of the results of national advertising for cooking and water heating can be made from the results of the E.D.A. cooking

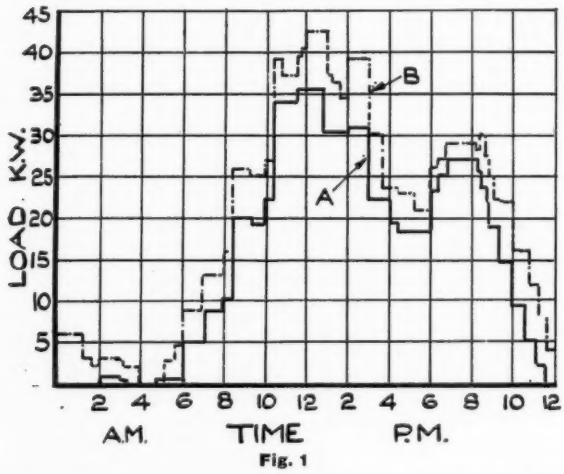


Fig. 1

and water-heating campaign. Newspaper advertising, both national and local, shows such small returns compared with that obtained from the same expenditure on circularising or canvassing that a comparison is of little significance; a comparison of the results from circularising is of greater value.

Circularising for water-heating load is more effective than circularising for cooking, and the results are obtained at less expenditure. A circular must contain no lengthy descriptions and yet must convey to the consumer all that he is likely to want to know about the apparatus described. This can more easily be achieved with water-heating than with cooking. As the water heater requires no attention all that need be given is the hire charge and running costs. If an inquiry instead of a direct sale follows a circular, a visit to the consumer more often results in an order being obtained for a water heater than for a cooker. The prospective purchaser of a cooker so often wishes to see a cooking demonstration before the order is placed.

The approximate annual costs of running a demonstration kitchen giving five demonstrations per week are as follows: One demonstrator, £175; provisions, £60; rent, rates, &c., £80; cleaning, £25; electricity, £10; cost of cooker and utensils, £5; total, £355. Assuming that 300 cookers are hired as a result of the demonstrations, the cost per cooker amounts to well over £1, an expense which in the water-heating load is covered by a few hours of the salesman's time and perhaps a small stand in the showroom.

Comparative Costs of Apparatus

The cost of the apparatus is a heavy item in load building. The following figures show the revenue that can be expected per £1 of capital expenditure on apparatus and installation for cookers and water heaters. The costs of the cookers are taken from the average of five makes as charged to supply undertakings. Interest and depreciation is taken on an estimated life of fifteen years. Maintenance charges are as quoted by undertakings for an average over the past seven years and the consumption is taken at one kWh per person per day.

No. of persons	2–4	4–6	6–10
	£ s. d.	£ s. d.	£ s. d.
First cost of cooker	8 12 0	12 5 9	13 7 0
Installation	3 15 0	3 15 0	3 15 0
Interest and depreciation	1 3 0	1 11 1	1 13 0
Maintenance	10 5	10 5	11 9
Total annual cost	1 13 5	2 1 6	2 4 9
Less hire charge	1 0 0	1 4 0	1 10 0
Annual cost to undertaking	13 5	17 6	14 9
Consumption, kWh	1,095	1,825	3,080
kWh per £1 expended	1,630	2,080	4,075

The number of cookers of the different types vary in the proportion of 2/4 size, 2; 4/6 size, 3; 6/10 size, 1. The average consumption per £1 of capital at the above proportions works out at 2,263 kWh. Comparative figures are not so readily available for water heaters but from details given by a large number of undertakings the following figures are obtained:—

	Two gal.	Five gal.	10–12 gal.	15–17 gal.	20 gal.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of heater	4 0 0	6 5 0	8 3 0	9 18 0	11 5 0
Plumbing	12 6	17 6	1 5 0	1 5 0	1 5 0
Wiring	15 0	15 0	17 6	17 6	1 0 0
Interest and depreciation (total installation)	9 8	14 11	19 8	1 3 3	1 6 0
Maintenance	3 0	3 0	4 0	5 0	7 6
Total annual cost	12 8	17 11	1 3 8	1 8 3	1 13 6
Less hire charge per ann.	10 0	16 0	1 0 0	1 4 0	1 10 0
Annual cost to undertaking	2 8	1 11	3 8	4 3	3 6
Consumption, kWh	700	950	2,000	2,700	3,100
kWh per £1 expended	5,250	9,910	10,090	12,700	17,700

Although very few undertakings include the cost of plumbing work in their hire charges, in order to get a correct comparison with the cooker installation an allowance must be included in these figures. Figures quoted by various undertakings vary between 15s. and £2 for plumbing, but a fair average is £1 5s. A large proportion of the maintenance expense for water heaters is due to periodical descaling in areas where water is hard. The figures quoted can therefore be greatly reduced in other areas to cover burnt-out elements and the slight trouble which some undertakings experience with thermostats. The average number of each size of heater per 100 heaters installed is: Two-gal., 21; five-gal., 6; 10/12-gal., 23; 15/17-gal., 28; 20-gal., 11; 30-gal., 7; over 30-gal., 4. Allowing for the varying number of different sizes the consumption per £1 of expenditure works out at 10,697 kWh.

Cost of Supply

The cost of supplying the load depends mainly on the load factor of the apparatus, and the diversity factors between various water heaters and also with reference to the other load on the station.

Fig. 1 shows the load curve for ten working-class houses: (A) before, and (B) after the installation of water heaters. The average connected load in kW per house was: Lighting, 0.55; heating, 4.00; cooking, 5.80; washboiler (3 kW), 1.20; water heating, 1.75; miscellaneous, 1.35; total, 15.05.

Though the load curve for the apparatus excludes water heating during any two different days, an approximate curve for the water heaters can be obtained by subtracting (A) from (B). This is shown in fig. 2. The load factor without the water heaters is 0.41, and that of the water-heater load 0.534. Though the diversity of the main load is 3.74 as compared with 2.19 for the water heaters, it is the diversity at the time of the peak load that is of most importance. Between the hours of four and ten the maximum diversity on the water heaters is 5.8 as compared with 4.75 on the remaining load.

The water heater adds to the peak load only to the extent of 0.172 kW per kW installed as against 0.21 kW of the other load. This is equivalent to reducing the standing costs of supply to about 0.8 of those of the main load.

The price obtainable per kWh depends upon what the consumer would have to pay for equal service by any alternative system, and it is generally accepted that the price obtainable for water heating is below that for cooking. Where gas is obtainable for 10d. per therm a penny could be obtained for

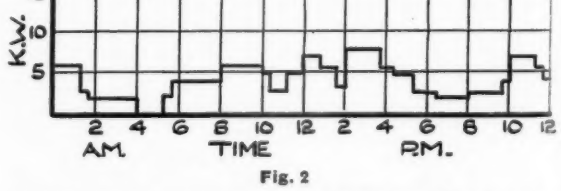


Fig. 2

cooking. Water heating at ¾d. per kWh would give a running cost equal to that for gas at 10d., and considering the many advantages of the electrical system there should be no reason why this price should not be obtained.

Referring back to the consumption per £1 cost of apparatus, 2,236 for cookers and 10,697 for water heaters, the equivalent revenue at the above prices is £9 6s. 4d. against £33 8s. 6d.

Another item which adds to the cost of cookers installed where they are connected to existing services is the necessity for the laying of large lines due to the heavy loading compared with that of water heaters. The costs of immersion heaters have not been included as these are hired by very few undertakings, but those which do so, in addition to complete heaters, find that most of their business is done this way.

Extensions in South Africa.

By E. C. Klopper, Assoc.(S.A.)I.E.E.

Progress during the past year

IN many respects 1933 will be remembered as an outstanding one in the sphere of power supply in South Africa. New developments in hand and in prospect, as a result of the easy money conditions obtaining in the country, provide ample testimony to the greatly improved outlook for the electrical industry. Apart from big extensions to existing power stations, the growth in the output of the many public supply undertakings has been very marked. There are now about 160 municipal electricity undertakings, and there are no cities and few towns which do not run their own supply. The aggregate output during that period has risen from approximately 350 million to over 450 million kWh.

The past year marked the occasion of the tenth anniversary of the Electricity Supply Commission, public confidence in

The stand of the Johannesburg Electricity Department at a recent exhibition

which is attested by the success of the big loans raised during the year. The extensions of the Commission's undertakings during the year comprised the completion of a 20,000-kW, 33-kV generator at Salt River, and the ordering of a similar machine to be commissioned in time for this winter's load in Capetown, where the domestic supply is increasing with remarkable rapidity. At the Congella undertaking of the Commission, from which Durban draws its power, a 20,000-kW set will be installed to augment the existing 48,000 kW of plant now in service. Schemes are in hand for extending the transmission and distribution systems of the Commission's undertakings, and the provision of additional sub-stations for the supply for traction and other purposes.

In Johannesburg a decade-old controversy between the City Council and the advocates of a partial "outside" power supply was ended. The Jeppe Street station of the municipality will be augmented by the installation of another 10,000-kW set, and ancillary equipment, at a cost of £93,000, and 8,500 kW will be taken from the Victoria Falls Power Co. Power extensions in view will cost over £550,000 over a period of ten years. The second portion of the scheme of extension in Johannesburg, costing £280,000, includes the installation of a 15,000-kW set, all buildings, and two 100,000-lb. boilers in 1936. In 1940 another 100,000-lb. boiler, costing £40,000, will be put into commission, and in 1942 a further 15,000-kW generator and a 100,000-lb. boiler.

In Pretoria, early in the year, a 12,500-kW turbo-alternator was started up, and the undertaking is again to be enlarged at a cost of over £350,000 in order to meet the big power demand of the S.A. Iron & Steel Corporation's Works when it commences production this year. The main additional plant will probably comprise a 20,000-kW turbo-alternator and four boilers, each of 80/100,000 lb. per hour capacity.

In the Smaller Cities

The Kroonstad Town Council is proceeding with a £60,000 electricity scheme which will involve the installation of an entirely new generating plant and the replacement of d.c. by a.c. The scheme was approved two years ago, but was held up owing to the dearness of money. At Port Elizabeth tenders were recently invited for a new boiler having a normal evaporative capacity of 70,000 lb. of steam per hour. Preliminary plans and specifications are now being prepared for additional generating and steam-raising equipment. At Grahamstown the power station is being enlarged at a cost of £35,200. East London contemplates spending £50,000 on extending its plant and as a preliminary step a 3,000-kW generator is now being ordered. Somerset West ratepayers have sanctioned the raising of a loan for the purpose of extending the undertaking.

The Fransch Hoek Municipal Council has completed negotiations with the Electricity Supply Commission for a supply of electricity, and the erection of a transmission line and distribution mains is in hand. The Lichtenburg Town Council is considering the installation of an oil-engine a.c. oil plant, to cost about £12,000. Bloemfontein is spending a considerable sum on additional cables and transforming apparatus and meters. An up-to-date all-electric station and control tower is to be built at the Rand Airport at Germiston. Oudtshoorn is raising a loan of £31,000 to convert its existing system to a.c. and for new generating plant with boilers. Krugersdorp is reconstructing its electricity system at a cost of £31,000, and at George specifications are being prepared for converting the present d.c. plant to a.c. at a cost of £19,000. At Mossel Bay, Parys and Villiersdorp electrical extensions are contemplated which reflect the power progress of small towns generally. Winburg and Nelspruit have both completed up-to-date schemes, the latter being a small hydro-electric plant, and at the S.A. Iron & Steel Corporation's Works at Pretoria a power station was completed.

Three Rhodesian municipalities are at the present time engaged on extensions to power plants. Salisbury is installing a 3,000-kW alternator, which is expected to be ready early this year, and Bulawayo is calling for tenders for a new 4,000-kW set. Gwelo, a town of about 1,500 inhabitants, is to install two 1,000-kW sets, for completion during 1934. The cost of supply to the consumer in these three Rhodesian towns is rapidly being lowered, and in consequence the domestic use of electricity has increased to an astonishing degree. The scheme at Umtali, another small town operating modern turbine plant, is now thoroughly established. An electrical scheme for the new capital of Northern Rhodesia, Lusaka, is to be proceeded with as early as possible.

The Victoria Falls Power Co. has various new developments in prospect as a result of South Africa going off gold, and will probably build a new power station. The company already has five stations with a total installed capacity of 390,000 kW, and consumption is continually advancing. All the power is supplied to the mining industry, excepting three or four per cent., which is used by other consumers, whose need also arises from business created by the mines. These non-mining consumers comprise all the municipalities along the Reef, except Johannesburg, which is now connected to the system for stand-by purposes, and a number of industrial companies. An agreement has been reached with the Government of Rhodesia for a new concession relating to the rights at the Falls, and the draft concession is now before the Colonial Office.

Railway Electrification Plans

The new Minister of Railways is an ardent advocate of electric traction where it is economically feasible, and already in

How Capetown Corporation draws attention to its electricity supply

Capetown the electrified line has been extended to Bellville, which is presumably the "thin end of the wedge" of electrification for the whole of the line as far as Worcester, or even farther. In Natal the main line is at present electrified from Glencoe Junction to Cato Ridge. A scheme is now contemplated, subject to Parliamentary sanction, to electrify the line to Newcastle, and the branch from Glencoe Junction to Vryheid. The work, which will be put in hand as soon as the Harrismith-Ladysmith scheme is completed, will cost roughly £300,000, and this sum will probably be put on the railway estimates for

the next financial year. It is confidently expected that Parliament will give the scheme its blessing, as it will result in a saving of nearly £70,000 a year on the working of the lines.

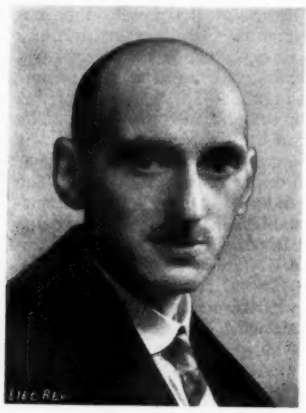
With the continuation to Newcastle and Vryheid there will be a network of electrified line in Natal, covering 526 track miles. South Africa will still further advance its position as owner of the second largest electrified system in the world, and the largest in the Empire. Its magnitude is exceeded only by the United States with the Chicago-Milwaukee system.

Projects now in hand and contemplated presage an early resumption of trade activity. For the electrical industry, at any rate, the omens have never been better.

Pulverised Fuel. By Vernon Walker, A.M.I.E.E.

A review of American progress during 1932-33

A REPORT on pulverised fuel for the year 1932-33 has recently been issued by the Edison Electric Institute. Forty-three operating companies contributed to the report, and of these sixteen use the bin system, twenty-four the direct-fired system, and three both systems. Of the 181 boiler units which the report covers, seventy-two with a steaming capacity of 21 million lb. per hr. are served by the bin system and 109 with a capacity of 34 million lb. per hr. are direct fired. The average capacity of the direct-fired units is 315,000 lb. per hr., compared with 293,000 lb. of those fired by the bin system.



Mr. V. Walker is assistant resident engineer at Bury

There is a trend in favour of the direct-fired system, the initial cost of which is approximately two-thirds that of the storage system. It is now realised that boiler efficiency is not a function of the system of firing used, if the coal has been equally well prepared. The coal and air streams must contain the proper proportion of coal and air within relatively narrow limits to be explosive. Investigation of 250 units in sixty-one stations show the availability factor of both systems is practically the same, being 0.95 over a period of three years.

Fineness of grinding in all types of mills, and particularly the attrition type, is appreciably affected by the quantity of air passing through the mill, fineness decreasing as the air supply is increased. Where mills are operated at various ratings to meet load changes the problem of regulating the air supply to obtain uniform fineness becomes difficult, because of the varying factors introduced.

The Effects of Moisture

Low moisture content in the coal generally reduces the wear on all parts to a marked degree. Mill bull rings and rolls will handle between 3,000 and 130,000 tons of coal with a life up to 18,000 hr.; exhauster fan blades may vary between 1,600 and 24,000 tons of coal and from 100 to 4,000 hr. When burning lignite and petroleum coke the wear of mill parts is relatively lighter. Coke breeze involves high maintenance charges and renewal of parts. Attempts to increase the life of mill rolls by grinding and building up by electric welding or by truing up surfaces of worn rings with a boring mill have proved unsatisfactory. The fitting of the ring wear to the rolls, the projecting shoulder on each side of the worn surface being removed with a cutting torch, gives a better fit between surface of rolls and rings. Special steel exhauster blades and blades with welding heads across the face have been discarded for ordinary steel plates, blades made of checker floor plate giving the lowest cost.

The problem of the flexibility of the units in response to changes of load is generally common to direct-fired installations, depending upon the type of mill and grindability of fuel used, but ball mills have been made more flexible than the boilers to which they are applied. These mills can pulverise wet coal at high capacity without pre-drying, which is mainly due to the classifier and air circuit. The classifier in one case is situated at the feed end of the mill, and the oversize which has been dried while passing through the pulveriser is mixed with the wet feed and delivered to the most active part of the grinding zone, the oversize absorbing moisture from the wet coal. Surface moisture causes over-grinding of the fines by making the particles stick together and form large masses.

The lag characteristic of ball mills has been eliminated by making the output of the pulveriser dependent not on variations in the feed rate but on variations in the air flow. The feeder maintains a constant fuel level in the pulveriser, the air being adjusted by an automatically controlled damper located at the exhauster inlet, an additional by-pass valve allowing air to pass to the burners *via* the exhauster without passing through the pulveriser.

Moisture in excess of a certain percentage, depending on the drying attainable in the mill, decreases fineness and reduces mill capacity; fineness also varies as the rate of grinding and falls off with wear of mill parts. The size of the ball charge is not so important as its weight; too many large balls must not be used; with balls of 1¼ in. and smaller the sizing makes little difference. The charge can be adjusted by ascertaining the weight of the ball loss per 1,000 tons of coal ground in a typical mill, and adding the balls in small increments.

A Large Pulveriser

The New York Steam Corporation has installed the largest pulveriser in existence to deal with more than 50 tons per hr. No gearing is employed, the rotor of a vertical synchronous motor being integral with the main shaft of the mill. A direct-fired mill, in which the rolls can be taken out of service whilst pulverising, is in use, and is an advantage under light load. Experience emphasises the need for a standard method of reporting " grindability " of coal, and a method devised by Messrs. Babcock & Wilcox which has been satisfactory was described in a paper by R. M. Hardgrove before the A.S.M.E.

Intertube burners in a slag-tap furnace are mounted on a water-cooled arch and direct the stream of fuel and air downwards towards the furnace floor at a slight angle from the front wall. The " U " shaped travel ensures complete combustion before the gas touches the boiler tubes. A Riley cyclone burner in one case burns sufficient coal to produce 135,000 lb. of steam, which means a heat release of 205 million B.th.u. per hr.

The lighting of burners with a portable torch is not satisfactory, nearly all explosions occurring when starting. At the Charles Huntley Station, with boilers of 500,000 lb. per hour capacity, the Babcock & Wilcox system is said to be a great improvement over any other so far in service. The pressing of a button on the control panel starts a fuel-oil pump, causing the projection of a fuel oil burner into the furnace immediately below each coal burner, and establishing a spark across a gap at the nozzle of the burner. Only three seconds are required from pressing of the button to the establishment of a large oil flame. There are sixty-two Bailey slag-tap furnaces in operation and fourteen under construction, for boilers of from 100,000 to 1,000,000 lb. of steam per hour.

Furnace Construction

Four types of furnace bottoms are installed in one large station: (1) magnesite forced-air cooled, (2) raw-carbon air-cooled, (3) magnesite natural ventilation, (4) magnesite water-cooled. These have given no trouble with regard to growth, and can be tapped with a load of less than twelve per cent. of the boiler capacity, the coal having a fusion temperature of 2,200 deg. F. Floor growth is prevented by the use of special water-cooled bottoms.

In one case the boilers had to be operated at about 70 per cent. of maximum capacity for several hours before tapping and during slagging. The use of soda ash as a flux and of water-cooled liners in the slag spout reduced the labour required.

Furnaces under trial at the State Line Station, Chicago, have walls of water-cooled tubes normally spaced, but with steel studs welded to the tubes and plastered over with refractory of a conductivity and thickness to give the desired heat transfer and close the spaces between the tubes.

With pulverised-fuel firing an accurate running check can easily be kept on the overall performance. A series of tests with ratings from 5,000 to 80,000 kW sent out by one turbine and two pulverised-fuel boilers capable of evaporating 560,000 lb. per hour at 450 lb. per sq. in. and 750 deg. were taken at the Huntley Station, only three additional men per shift being required to conduct the tests. Quick response to load changes is also commented upon, an increase of load from 10,000 to 29,000 kW being taken up with a drop in steam pressure of only 60 lb., the steaming rate being increased from 130,000 to 440,000 lb. per hour in eight minutes.

Seen at the Fair

Some switchgear novelties in the Birmingham Section

IT is significant that a very large proportion of the electrical displays at the British Industries Fair comprise domestic equipment, apart from similar appliances to be seen in the heating, building, hardware, and general sections; or such smaller lines as mouldings, lamps and shades, clocks, and radio equipment which are being shown in London. Altogether quite three-quarters of the electrical exhibits must be more or less domestic in character.

Evidence of a greater degree of standardisation is accumulating, particularly in respect of the smaller appliances and wiring accessories. It is especially pleasing to note that on more than one stand there are sets of plugs and sockets of various makes which demonstrate that, provided these accessories are made in accordance with British Standard Specification No. 372 as amended in 1933, the requisite degree of interchangeability can definitely be assured with round pins.

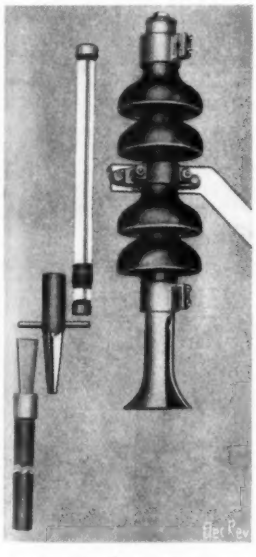
This is an opportunity for again stressing the importance of the 1933 amendment, with which some manufacturers are not strictly complying on account of the necessity for clearing stocks. Messrs. J. H. Tucker & Co., Ltd., achieve the "floating flexible" principle by the use of a split pin and socket in two pieces, bound together by a spring, thus disposing of the round *versus* flat pin controversy.

The "Titan" tumbler switch is now made with a hump in the porcelain base with which a tripping tongue on the dolly engages to prevent balancing midway, so avoiding light contact. Other new Tucker products include mains radio polarised aerial-earth plugs and sockets, with or without switches, all under one cover; new types of "Stelac" fuses; an attractive domestic fuse box in wood with a novel, easily removable cover and other new features; and a switch-fuse in a moulded case with a unique interlocking operating handle; while "Telacizing" is a new method of rustproofing metal components by oil finishing, low-temperature galvanizing, or the application of "Tuckamel."

The "Ray" Engineering Co., Ltd., has a new miniature-type circuit-breaker in a moulded case which is made throughout by the company and is in demand for use as a domestic current limiter. It is made from 15 A down to 1 A, double and triple pole; it has a free handle and ingeniously devised magnetic blow-out, while the setting is particularly easy and close.

Metal Rectifier Progress

Fresh applications of metal oxide rectifiers introduced by the Westinghouse Brake & Saxby Signal Co., Ltd., include the operation of circuit-breakers instead of a motor or battery. Rectifiers are supplied for switches requiring up to 100 kW to energise the solenoid. They are designed on a rating of 30 seconds load per hour, hence one may be used to operate up to six solenoids, one at a time, by selectors on the d.c. side and push-buttons on the a.c. side.



The English Electric "R.D." fuse unit for rural distribution

A metal rectifier is also now available for eliminating intercommunication house telephone batteries. Input and output tappings provide for voltage selection on the transformer, while a separate rectifier and smoothing circuit are provided for the ringing circuit to reduce risk of interference by pick-up. Extremes are represented by a rod-type rectifier to give a very small current at very high voltage for X-ray and similar work, and a sheet or plate type with an output of hundreds of amperes at low voltages for electro-plating, and similar purposes. The efficiency is higher than that of a convertor, and the size, weight, and number of parts are considerably smaller than those of a normal disc rectifier. A 12-in. by 3-in. plate will carry 15 A, and 2,000-A rectifiers are quoted for.

What is a "Trubicle"?

The "Trubicle" is a practical combination of withdrawable truck-type and cubicle switchgear, designed by Switchgear & Cowans, Ltd., to appeal to those who do not fancy metal-clad compound-filled gear and yet appreciate its virtues. Visible isolation is achieved by a few turns of a handle, and the circuit-breaker can be wheeled out conveniently through the front door, interlocks preventing errors. Having been withdrawn, the oil tank can easily be opened for inspection and the breaker lifted out simply by raising the hinged lid. The breaker rests at all times on the floor of the cubicle, so that the framework does not have to support its weight.

A new variable-stroke fuel oil pump for boilers is to be seen

An example of "Trubicle" switchgear

on the stand of Messrs. T. H. & J. Daniels, Ltd., associated with the Rotoplunge Pump Co., Ltd. The electrically driven pump is of the standard Rotoplunge type with reciprocating plunger, rotary motion, and no valves. It is controlled automatically by a Hagan regulator valve which, through metal bellows and levers, is operated by small variations of pressure at the pump delivery. This valve controls the movement of the power piston, which is connected to the pump by levers that in turn vary the stroke of the pump plungers.

Compensating devices prevent hunting, and pressure remains constant while admission is varied. Power absorbed is reduced according to duty, costly and heavy gear is avoided, and by-passing is unnecessary, thus avoiding depreciating the oil by uselessly circulating and churning it in the pump.

More Switchgear

For rural overhead distribution the English Electric Co., Ltd., has a unique high-voltage fuse unit. It consists of a hollow insulator up the centre of which a cartridge fuse is inserted and held by a bayonet socket at the bottom, a spring at the top maintaining good contact pressure. The fuse is inserted or withdrawn by a pole of special design and location is facilitated by a cup-shaped entry at the base of the insulator, manipulation being extremely easy.

Another new "English Electric" product is a metal-clad combination switch and fuse of unusually small size and compactness. The fuse takes the place of the switch blade connector, so avoiding the use of separate switch and fuses, one above the other. The contacts are of a new robust design; the blade links are made of insulating material, so that the operating spindle need not be insulated; two interlocks are provided, one for the cover and the other to prevent the switch blades making contact while renewing the fuses. Cable entry is assisted by doing away with the need for looping-in under any condition.

The 230-V lighting system for collieries produced by the Simplex Electric Co., Ltd., for application up to 300 yards of the coal face has flameproof glands provided in the fittings, which are mostly of the double-compartment type, so that the terminal box (which can be compound filled if desired) can be got at without breaking the main seal of the lantern or switch box. The system has the approval of the mines authorities and has been tested at the Buxton station.

The "Simplex" stand is illuminated by architectural coloured lighting. The stand is in the form of two overhanging canopies supported on the cantilever method from the central structure. The floor area beneath the canopy

is lighted by luminous beams along the edge of the girders, and so arranged that the white light is not thrown on to the ceiling, which is lighted in colours by novel fittings supported just above eye level on ornamental profiled tubes. In addition, the walls of the central structure are floodlighted in contrasting colours. For the first time "Simplex-Credalux" interior floodlights have been used to light the facia boards, mounted on roof trusses at a distance of 50 ft., while these fittings have also been provided with louvred fronts in order to avoid dazzling onlookers' eyes, the source of light not being apparent.

Among the newer exhibits of the Cambridge Instrument Co., Ltd., are mercury-in-steel thermometers, both indicating and recording. The principal improvements in these are in the construction of the bulb, the capillary tubing and the Bourdon tube, and in the adaptation of the instruments for mercury-vapour thermometry. The company is making, on a commercial scale, fine bore capillary tubing of such a nature that errors over lengths up to 120 ft. are negligible.

Recording thermographs in pressed-steel cases have charts 10 in. in diameter, or 1½ in. larger than formerly, and the pen projects downwards from the top of the chart, thus avoiding the possibility of ink running down the pen and corroding the mechanism.

A new form of CO_2 metering unit for boiler flue gases employs an electrical method, and includes no chemicals or delicate glass work. It is combined with a bubbler and aspirator in such a manner as to prevent the possibility of splashing or flooding the meter; choking of the bubbler is guarded against, it is clearly visible while working, and can be dismantled for cleaning in a few seconds.

Demonstrations

Apart from its stand exhibits, the British Thomson-Houston Co., Ltd., has installed "Mazda Mercra" lighting along the roads on the south and west frontages of the Fair buildings, the lamps being housed in "Veron" and directional "Diron" lanterns mounted on concrete posts supplied by Ferro-Concrete & Electrical Construction, Ltd. The switching is controlled on the photo-electric relay system and is actuated by the variation of daylight intensity.

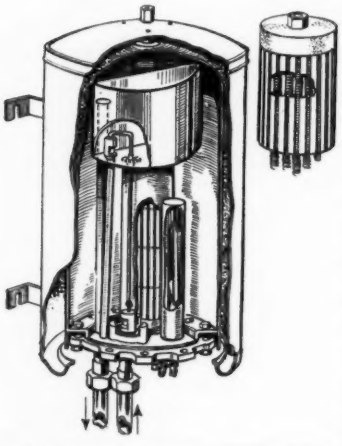
The introduction of the "Sieray W" gaseous discharge lamp, which produces a "natural" light with daylight effect, is creating considerable interest. Eight of these lamps of 400 W each have been mounted on 26-ft. poles in staggered formation along 220 yards of road adjacent to the siding in which the L.M.S. train "Royal Scot" is exhibited. Siemens Electric Lamps & Supplies, Ltd., have also installed projectors housing these lamps for floodlighting the train, thus revealing the distinctive colours of the locomotive and coaches in their natural hues. The buildings are floodlighted by means of G.E.C. equipment.

Heaters by Berry's Electric, Ltd., are installed in the lounge and exhibitors' dining room, while those in the Royal Dining Room are of Revo make. Gent electric clocks are being used throughout the exhibition buildings.

Domestic Heating and Cooking

Indications of the trend of development

PROBABLY the outstanding novelty of the Birmingham show is the combined cooker and refrigerator of the Pressed Steel Co. of Great Britain, Ltd. By comparison with a vertical cooker the refrigerator portion is in the usual oven position, the oven, measuring about 12 in. cube inside (1,500 W), being overhung above the tall back splash-plate where one sometimes finds a hot-cupboard. A hob in the usual position is equipped with a 1,750-W boiler-griller and a 1,500-W boiling plate, both of these units having the embedded type tubular elements which operate with the sheathing red hot. There is a grilling and warming space about 6 in. deep between the hob and the refrigerator top. It is the first oven we have seen fitted with embedded tubular-type elements of the pattern used for boiling plates.



Anti-drip and element arrangements in the English Electric water heater

A point of interest in the new cookers of Eaton Canadian Products (England), Ltd., is the method of plugging in the oven elements. The "knife-switch" blades are of phosphor-bronze and the sockets of stainless steel. The knife-switch method adopted by Belling & Co. last year for the hob units of its new cookers has been improved. The clip contacts are now shrouded at the top by extension pieces from the porcelain blocks and at the front by fibre insets.

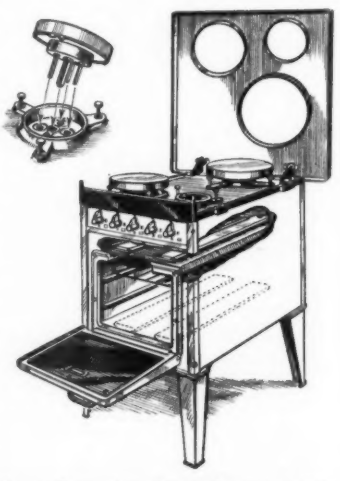
There are three of these cookers as a "standardised" range, the smallest with an oven interior of 13 in. by 13¾ in. by 12 in. (2,000 W) and a 2,000-W boiler-griller, a middle size with a similar oven and an additional hob unit (1,600-W boiling plate), and the largest model with an oven 14 in. by 14¾ in. by 15¼ in. and two boiling plates, 1,600 W and 1,000 W, in addition to the griller-boiler. A novelty on the smallest model is an enamelled draw-out shelf under the oven with useful cooking data printed on the top. We were told that the new finish (vitreous enamel) on all the Belling cookers really passes the lemon-juice test.

"Exterior" oven elements is, of course, the design feature of these cookers, and also of those of British National Electrics, Ltd., and we were interested to see that the idea is partially applied to all except the smallest of the English Electric Company's four models, which have, in addition to the "interior" plug-in side elements, "exterior" bottom elements near the oven front, giving some measure of protection against quick open-door cooling near the front of the oven.

Continental and Dominion Equipment

That this idea is also Continental practice we gleaned from an inspection of a range of "Continental" cookers shown by the General Electric Co., Ltd.

A comparison of three distinct ranges of cookers on this stand was particularly informative. Models for Palestine, Holland, Sweden, &c., have drop-down doors, top and bottom heat ("external"), no provision for separate grilling, more hot-plates (four, where on a home market model there would be only two and a griller-boiler), a concentric arrangement of plug-in contacts for the hob units, very deep ovens, black hobs, white sides and fronts and chromium-plated legs, special wiring for 380 V, and the element units connected individually directly between phases, but with each cooker as a whole balanced between the three phases. The first four of these features also apply to the cookers designed for the Dominions, except that the top oven element operates "bright" for broiling. But these cookers are of a more substantial construction, and on a par with the home market equipments, and the finish is plain enamel. We still wonder at the Englishwoman's aversion to the drop-down door, and we were told that it is useless to try to sell a side-door cooker outside this country. We should secure the Colonial business, and it was pleasing to see the new Revo "Dominion" cookers (described on another page) and to hear of increasing orders for these from overseas.



General construction and some details of a "Magnet" Continental cooker

On a Moffat cooker we saw an unusual scheme for heat deflection in the oven. Under, and heat insulated from, the bottom tray, over the bottom elements, is a dome-shaped, bulge downward, deflector whose function is to spread the heat outwards and direct it through louvres at the sides of the tray. No. 396 Moffat cooker has two roasting ovens, one over the other, and two independently heated hot-cupboards of about the same size as the roasting ovens. Between the two cham-

bers of a two-tier confectionery oven a hinged door carrying the switches exposes the wiring in a space about 6 in. high, well ventilated at the back, when it is open.

High-speed Boiling Plates

There is little new in the way of boiling plates. We did not see one open unit, and by far the majority are of the embedded type, either "solid" or of the ring or the coil "radiant" styles. There are two interesting open low-voltage developments, the Revo patent "Superspeed" rectangular griller boiler, measuring 9 in. by 6 in. (2 kW), and a transformer plate produced by the Simplex Electric Co., Ltd., for any of the "Creda" cookers on the market.

The latter is 8 in. in diameter and is loaded at 2.25 kW. Three-heat control is provided by suitable tappings on the transformer. It is claimed for this that it is extremely sensitive to heat control and that the element reaches bright red within a few seconds. There seems to be no suggestion that this new plate should supersede the existing and new "Creda" embedded type plates.

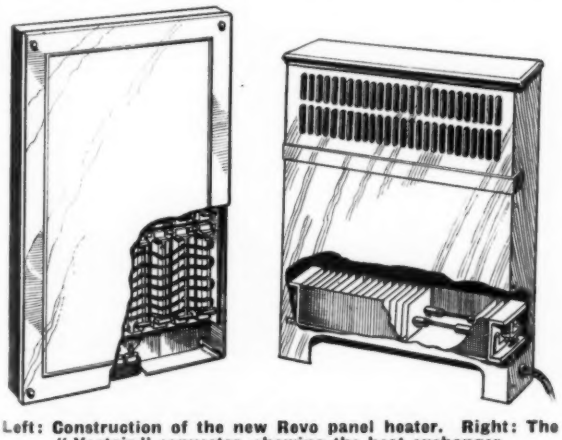
On the stand of Hotpoint Electric Appliance Co., Ltd., we saw for the first time a round "Torribar" plate. It was on cooker No. 6012 which has been fitted previously only with "solid" plates. The boiler-griller with embedded tubular elements by British National Electrics, Ltd., on its breakfast cooker, is now available on the ordinary large cookers. But as applied to the breakfast cooker only the loading has been increased to 2,250 W by the addition of a 500-W rectangular coil in the centre, all within the same area of 9 in. by 7 in. The extra coil is, in effect, a separate small boiling unit, and there is a suggestion that four-heat control might be adopted for the complete unit, thus providing a wide choice.

A historical display of "Magnet" boiling plates tells a good story:—

Period.	Type.	Loading.	Performance.
1898—1910	Embedded in vitreous enamel	600 W.	2 pts. in 30 min.
1910—1912	Mica, clamped iron top ...	800 W.	2 pts. in 25 min.
1912—1920	Ditto, but with pressed steel top	950 W.	2 pts. in 22 min.
1920—1926	Open coil	1,200 W.	2 pts. in 19 min.
1926—1928	Ditto, but with nickel chrome cover	1,200 W.	2 pts. in 21 min.
1928—1932	Totally enclosed and embedded	1,600 W.	2 pts. in 8½ min.
1932—1934	Ditto	1,800 W.	2 pts. in 7½ min.

"Baby" Cookers

The "Cadet" cooker displayed by Carron Company is the smallest pedestal model we have seen with a separate grilling chamber complete with a door. It has an oven measuring 10 in. by 10½ in. by 11 in., a 2,000-W griller-boiler, and a total loading of 3,250 W. But the new 90J Jackson runs it a close

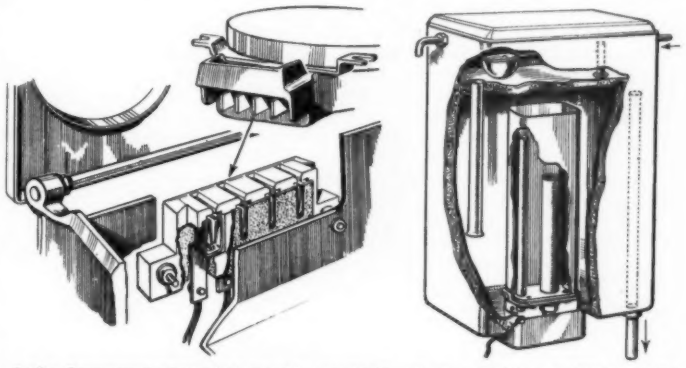


Left: Construction of the new Revo panel heater. Right: The "Vectair" convector, showing the heat exchanger

second in the same respect, with an oven space of 10 in. by 12½ in. by 11¼ in. and a total loading of 3,200 W (oven 1,200 W). A new Belling "Baby," which is, except for the cast-iron hob, of all sheet-iron construction, all vitreous enamelled, has a standard 2,000-W boiler-griller and a bottom oven element.

A development of the "Nippy" cooker (Berkeley & Young) is a model with a lagged oven, a hot-plate which also serves the oven and a 400-W bottom oven element which can be exposed to a warming cupboard under the oven and used for light grilling. It is to be priced at about 65s., and sold complete with a themometer. It was whispered that this "B. & Y." table cooker is the forerunner of an ordinary pedestal cooker embodying the same idea, *i.e.*, with a grill chamber under the oven served by the bottom oven element.

The Jackson Electric Stove Co., Ltd., is keen to impart the idea of capacity in cooking terms rather than in dimensions, and in this connection their representative made a very interesting point which, we think, is not generally appreciated, namely, that in terms of capacity an equivalent gas cooker costs more. The 95J, he said, will take a 20-lb. turkey, and it costs £15 17s. 9d. He told us to ask any gas-cooker exhibitor the price of a cooker with equivalent control, finish, etc., to take a 20-lb. turkey. We did, and sure enough the answer was 17 gns.



Left: Improved shrouded plug-in contacts of the Belling boiling plates. Right: New "Genii" cistern-type water heater with inlet in main container

We were impressed by the number of new low-temperature and non-luminous equipments displayed. A Revo panel heater has a "Uralite" back, between which and a polished copper sheet reflector is slag wool insulation. In refractories supported on pins held by the turned-up edges of the reflector is interlaced a spiral resistor over the whole area. A front cover is vitreous enamelled, black inside and mottled outside. The heater measures 13 in. by 25 in. by 2¼ in., and is loaded at 1,250 W.

In addition to the new panel heaters produced by Frederick Braby & Co., Ltd., and described last week, we saw some skirting heaters displayed by the same company. These measure 3 in. by 1¼ in. projection, and are of similar construction to the panels, and they are loaded at 60 W per foot length, being available in any convenient lengths. Two displayed are arranged two-tier in parallel, and have a box-type end junction chamber.

There is an increase in the number of tubular heaters shown, and most fire manufacturers are giving this equipment more prominence than usual, and are more ready to admit its importance.

Convector Equipment

A number of convectors, too, are to be seen at Castle Bromwich. Messrs. Greene, Phillips & Co., Ltd., have produced a new model "P.H." convector with a projection of only 6 in. to meet objections which have been raised by some architects. To do this the coils inside have been reduced to 2 in. in diameter and, of course, increased in number. There are four sizes of the new model, with loadings of 450 W, 600 W, 900 W and 1,200 W.

The "Vectair" shown by British Trane & Co., Ltd., is a convector with a heat exchanger consisting of tubular elements within and in intimate contact with horizontal copper tubes on which are expanded radiating fins. The exchanger is arranged horizontally at the bottom of the convector. The heater is made in sizes ranging from 20 in. by 24 in. by 3⅝ in. deep (800 W) to 36 in. by 30 in. by 5⅛ in. (3,300 W). The top is heat insulated.

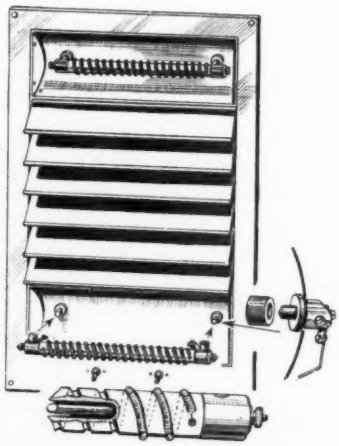
"Thermidair," a convector displayed by the Midland Metal Diecastings Co., Ltd., has a similar heat exchanger. The fins have vertical corrugations, and the element unit consists of six spirals within almost closed grooves around the periphery of porcelain pieces, a very similar arrangement to the water heater immerser of that type. It is available in 1-, 1½- and 2-kW sizes, with projections of 4¼ in., 4¾ in. and 6¼ in., respectively, and there is also a 2½-kW heat exchanger available without a case for building-in work. Two-heat (full and half) control is applicable to all models. Another convector introduced by Standard & Pochin Bros., Ltd., has three 1-kW rod-type elements arranged horizontally on the interior of the front of the "box." The equipment has a projection of 5½ in. and is 27 in. wide and 30 in. high.

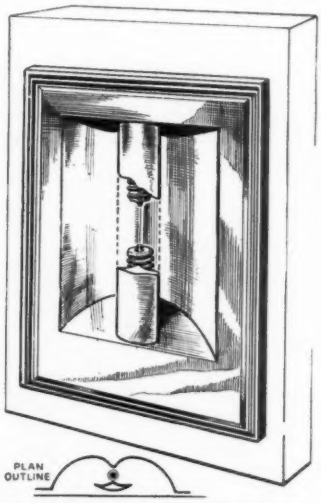
Inset Fires

Quite definitely, however, the advance in low-temperature equipment does not seem to have caused any setback in fire progress. There are more new models and types than ever. Probably within the full period of the Fair one could make

a reasonable inspection of each new fire. The biggest development is in connection with inset fires, and it seems that all the manufacturers now produce this class of equipment. "Inset" will perhaps be the wrong word soon, however, for some makers are concentrating on the idea of fixing the fire complete with the surround direct on any wall, without excavation. And it is surprising with what little projection this can be effected. Berkeley & Young, for instance, have a new range of "Dinky" fires with surrounds little more than an inch thick which just screw on to the wall. Designed on the same lines there is an excellent range of Belling fires. The inset fire is not portable, so the wiring becomes permanent right up to the fire terminals, a switch being incorporated in the unit—hence a plug and separate switch is not required. On some Belling models that we saw there is a little cover below the fire proper, which, when removed, exposes the terminals. We also saw a corner right-angular fire, to fix which it is only necessary to chase the wall to receive two side lugs.

Corner fires are also a feature of the new developments of Berry's Electric, Ltd., on whose stand we saw some with imitation fuel at the bottom. We are always very impressed by the ultra-modern finishes and styles of fires shown by Berry's and other makers, and it seems that the continual striving for change is now a definite part of the fire maker's lot. Berry's Electric have reintroduced the reflector fire after some years lapse; not in all cases, for many period fires certainly do not lend themselves to it. The new "Winchester" fire has two reflectored bar-type elements under the fuel.





Left: A "Sunray Tricity" fire, showing the element and connection details. Right: Dual reflector arrangements of the Simplex "Inigo" fire

We think, too, that rod-type reflectored elements have greatly improved many of the "Sunray Tricity" fires sold by L. G. Hawkins & Co., Ltd., and we were impressed by the simplicity with which the rods can be removed. With each end supported in one hand knurled nuts which "stay put" on the element can be unscrewed (or screwed up). A steel pin runs right through the porcelain rod, and the spirals are "tied" to the porcelains by asbestos cord, which is threaded right through the spiral. We saw also on this stand lower-priced ordinary non-reflector fires with a very quick heating-up resistor with three "turns" to the kW. The G.E.C. and Bratt Colbran & Co., Ltd., are showing fires with an outwardly projecting baffle over the element to protect walls against blacking. Bratt Colbran are also showing a combination coal and electric fireplace, the electric unit of which is really a specially designed inset fire. Electric Radiators, Ltd., have a sweepingly curved reflector unit with the rod element plugged in downwards at the bottom front of the reflector.

We like the new three-heat, two-rod (750, 1,250 and 2,000 W) Ferranti "Glowera" fire because of its all-the-year-round appeal. It has a sister, equipped with dogs, and a common feature is the hammered copper reflector with a screened lamp at the bottom to give a warm glow. Ferranti panel fires retain the rod-type reflectored-element principle associated with the name. The Simplex Electric "Inigo" fire has unusual reflector arrangements. The vertical rod-type element is sandwiched between the mid-points of the back and front "bird-wing" pairs of reflectors. Duplex reflection and consequent "spread" of heat is aimed at. On the G.E.C. stand we saw a fire with a cupboard under the element embodied in the framework and design containing a slot meter, for hotel bedroom use.

Water Heating

Water heating is obviously making rapid strides, and Mr. Nesbit (Simplex Electric Co., Ltd.) told us that his company is supplying one hundred units per week to one large undertaking in this country. The principal feature of his company's improved equipment is the easier wiring and fixing arrangements.

The move towards simplicity of wiring is also evidenced in the new circulator displayed by Geo. Bray & Co., Ltd. But perhaps a more important point about the external connections is that they are in a cool spot, outside the main cap and protected by a supplementary bakelite terminal cover. Easy fixing, without soldering, is the feature of the new circulator introduced by Aidas Electric, Ltd.

It was pleasing to see "in the flesh" the flexible element of the new circulator units introduced by Ferranti, Ltd. Short pieces of dual-holed porcelain are threaded with the spiral, down one side and up the other, and when "home" the porcelains are in intimate contact with the sheath.

George Nobbs & Co., Ltd., have introduced a cistern-type heater with the feed pipe from the cistern in the main container outside the cylinder housing the element and thermostat. The main object of this departure from usual practice is to stop furring on the heater, etc. There is practically no circulation of water, that in the inner container remaining there practically constantly, so that for heat exchange to the main bulk of water in the main container the contact around the sheath is relied on. It is considered that the advantages of the restricted feed are outweighed by those of non-furring.

Mr. T. Robson, of this company, spoke strongly of the advantages of booster heating, and because of the successful results obtained in America, presumably after copying the idea from this country, he predicted a big advance in this connection at home in the near future.

A new detail in the "Genii" boosting equipment is a tube communication inside the outer casing between the top and bottom heaters, so as to avoid two separate external connections. We saw the new Geo. Nobbs heater and thermostat combination on a common flange. Both the porcelain and sheath have a figure-of-eight construction, so as to give a greater emission surface. A 1½-kW unit has an inside-tank projection of only 10½ in. The Hotpoint "Torribar" immersion heater is now made up in the form of a circulator, both as an automatic unit with a thermostat and as a non-automatic equipment with three-heat control from a separate switch. The outside tube is detachable—an advantage when defurring—and the actual element spiral does not commence until well below the water exit hole, so that the big heat drop at the top helps to solve the furring problem and eliminates the tendency to boil at the top. Because of the small space occupied by the "Torribar" proper it is possible to get the whole into a 2-in. boss, and because of the rigid structure it is hoped that the probable vibration on a.c. will help to prevent defurring.

In the new 1½-gal. Sadia heater a reduction in the diameter of the elements has permitted increased spacing between the element tubes—another move towards overcoming furring difficulties.

An Anti-drip Device

The latest anti-drip arrangement adopted by the English Electric Co., Ltd., in its new 1½- and 12-gal. push-through free-outlet heaters is of unusual interest. At the top of the outlet pipe is a cup equipped with two valves, one controlling the inlet to the cup from the main container and the other controlling the flow to a supplementary outlet connected to the main outlet. A cap and sheath unit over the inlet, and a rod attached to it, is forced upward under the inlet water pressure, so closing the cup-inlet valve and opening the cup-outlet valve. The cup thus drains. When the water is turned off the cup-inlet valve opens and the outlet one closes, so that the cup is again filled from the main container, thus reducing the water level in the main container to below the top of the outlet pipe.

An addition to Berry's Electric "Canvary" heater is a supplementary outlet for small quantities of hot water. It is simply a straight-through pipe with a suitable cock at the bottom. In conjunction with the under-basin barber's foot-rest heater introduced last year we saw a sleeve-type mixing valve on the actual basin, similar to that employed in the "Canvary."

It is not possible in this article to review adequately the small appliances on show, but it is worth recording that on the stand of L. G. Hawkins & Co., Ltd., we saw a kettle with a tubular-type embedded immersion element running white hot with the kettle dry.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Safety Measures in X-ray Work

PRECAUTIONS against electric shock to be observed when using X-ray apparatus, both medically and industrially, are treated of in some detail in the paper by Mr. L. G. H. Sarsfield which was read before the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 22nd.

The importance of proper bonding, effective earthing, and adequate insulation is stressed, while attention is drawn to the possibility of the presence in the primary circuits of high-frequency currents received from the secondary side, either by aerial pick-up or by capacitance coupling of the primary to the secondary. Whatever the source of these oscillations, precautions must be taken for getting rid of them, since they may lead to dangerous discharges.

A remedy which has been applied in the Research Department, Woolwich, is the connection of centre-earthed condensers across primary circuits liable to be affected.

Three views of the National Society's Training College of Domestic Science mentioned on page 282. Above, a sitting room with an ornamental electric fire and low-temperature heating. Left, the lavatory with an immersion-heated circulator. Right, one of the work rooms

The use of signal lamps demands careful attention, since it is so easy to misinterpret their meanings. Concerning personal safety from electrical dangers, warning lamps are really most important when the apparatus has parts operating at high voltage which can be touched at will. Apparatus totally enclosed in earthed sheaths does not require indicating signals, except to advise an operator that power is on, to show a possible emergence of X-rays, and to give warning against waste of electrical power. Some operators prefer not to have any signal lights at all, whatever type of apparatus they use. It is felt that if signal lights be used to show the presence or absence of danger it should be possible to devise some foolproof code which would be at the same time both positive and simple.

The author has not discovered any information regarding the time required for dangerous muscular reactions to occur, except in the general way that high-frequency energy is not usually dangerous, while low-frequency is. The wave-form of the supply probably also has a bearing on physical effects. It has been said that induction coils are the least dangerous, due to the collapse of voltage on heavy load; condenser sets come next, and rectifier transformers are the most dangerous of X-ray equipments, owing to the maintenance at high loads of so great a proportion of the maximum voltage.

The very sensitive "Salvator" relay outfit is available for tripping the primary transformer circuit in the event of any part of the secondary h.v. circuit being accidentally touched and consequently earthed.

Total enclosure is the very sound principle on which modern apparatus is based, economy of space being effected in several novel ways. The use of flexible earth-sheathed connections has demanded a special type of cable, the characteristics of which are discussed in the paper, while the various methods of "making off" high-voltage cable ends are explained in some detail.

Finally some foreign safety regulations are reviewed. The author emphasises the need, which is a real one, for definite instructions to promote safety from electrical dangers, and suggests that the I.E.E., in co-operation with the British Institute of Radiology, might set up a body to deal with the matter.

Ships' Auxiliary Machinery

AUXILIARY plant for marine engine installations is dealt with in the paper by Mr. P. L. Jones which was read before the NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS at Newcastle-on-Tyne recently.

In general, the best solution is to have all the auxiliaries electrically driven, says the author, the power being produced by oil-engine generators or turbo-generators, which may be condensing or non-condensing. These arrangements, however, while appreciably more economical, are much more expensive than steam-engine drive, and detailed investigation must be made in each case before the final choice is arrived at, as the matter is intimately bound up with the question of feed heating.

Some engineers think that electrically driven centrifugal feed pumps are not sufficiently reliable to warrant their application to marine installations. The author's firm installed pumps of this type in several ships over twelve years ago, and they have worked extremely well ever since. Their upkeep cost is somewhat less than that of pumps of the steam reciprocating type, and their reliability is amply established. The feed pump can be electrically driven for a consumption of less than one per cent. of that of the main engine, and the possible gain in overall fuel consumption is therefore 1.4 per cent. This is a very appreciable amount, and in an oil fired ship of 10,000 h.p., would be worth £300 to £400 per annum, the price of fuel being taken at 30s. per ton.

An electrically driven rotary condenser air pump could easily be designed to do the work of a steam ejector for about 0.4 per cent. of the main engine power, and the overall economy would, therefore, be increased by three-quarters to one per cent. The power required for the condenser water circulating pump is often as much as that of all the other engine room auxiliaries together. For highest economy the circulating pump, above all others, should be driven electrically, and when this is done the economic limit of vacuum is appreciably higher than with steam drive. This aspect is affected by the feed-heating arrangement. Six methods, three with steam- and three with electrically driven auxiliaries, are considered and the price comparison is simplified by allowing for electrically driven deck machinery.

The case of reciprocating engines is a good deal simpler than that of steam turbine installations. The best arrangement

thermodynamically is arrived at by driving the auxiliaries electrically from Diesel-driven generators and obtaining the steam for feed heating by bleeding from the main engine. In special cases which the author has investigated where a big electrical load has to be provided in any case for certain duties, and where the time in port, loading and discharging, is comparatively large, this latter arrangement is definitely an economic proposition.

One of the most important developments is the use of the exhaust from the reciprocating engines to drive a steam turbine, which helps to drive the main-shaft either direct mechanically or through an electric generator and motor. Lower transmission losses make the mechanical system more efficient than the electrical, and its first cost is also found to be lower.

Another method is to use the exhaust turbine for driving an electric generator, the output of which is employed partly for electrically re-superheating the steam and partly for driving accessory plant. Pulverised coal is not so suitable for marine work as mechanical stoking. When the stokers are driven electrically the power required to operate them is less than half of one per cent. of that of the main engine.

When oil engines are used for propulsion as many auxiliaries as possible are driven by the main engines direct, the remainder being electrically operated. When the whole auxiliary plant is electric the power needed is about three per cent. of that of the main engine.

The Structural Design of Power Stations

THIS is the title of a paper by Mr. R. B. Rowson which stations has not received the consideration that it deserves, says Mr. A. C. Dean in a paper which he read before the Lancashire and Cheshire Branch of the INSTITUTION OF STRUCTURAL ENGINEERS at Manchester on February 14th. He considers this surprising, since the cost of the buildings may be from 20 to 25 per cent. of the total cost of the station.

Maximum economy of structural design has frequently to be sacrificed to meet the special requirements of plant manufacturers, who almost always demand considerable modifications in detail. The author therefore thinks there is much to be said for an arrangement of framing such as was used for the Deptford (West) station, where the principal bracings of the buildings are accommodated in special bays, leaving the remainder of the buildings as clear as possible.

To indicate how the framing of the exterior of a large station may be varied between the schematic and final states the author reproduces a series of drawings which show how the structural design of the Battersea station was changed six times.

In order to arrive at some idea of the additional capital costs chargeable against a station according to the degree of external elaboration necessary, the author prepared a short time ago a fairly accurate estimate for the relative costs of a station of about 100,000 kW, and it was then found that with an average architectural appearance of the type familiar at, for example, the Barton and the Agecroft power stations, as compared with a building of the same capacity treated purely industrially or as a utilitarian structure, would mean a total excess cost amounting to a sum not exceeding the order of about £50,000, possibly from 2½ to 5 per cent. of the total civil engineering costs of a large capital station. The difference in cost of the work above foundations is not a very large matter, but the heavier walls required under more elaborate circumstances necessitate heavier steelwork and correspondingly heavier foundations.

A Philosophy of Tariffs

THIS is the title of a paper by Mr. R. B. Rowson which was read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS, on February 16th.

At the moment the largest part of the revenue received from the sale of electricity is from consumers charged on flat rates based on the "what the traffic will bear" principle. This principle is popular, though there seems little justification for invoking it to fix tariffs for electricity supplied for purposes for which it is not the most economic method of utilising the national resources. Furthermore, it is doubtful whether an industry can progress very far if its tariffs are diametrically opposed to its costs. For these reasons it is suggested that all tariffs should be so arranged that all consumers pay their share of the costs involved. In addition, attempts should be made to enable the consumer to pay for the electricity in small quantities immediately before its use.

Underwater lighting at the new Holborn Baths. The installation comprises twelve "Ediswan" projectors housing 250-W lamps and it is claimed that there is a saving of 25 per cent. in the lighting bill

The consumer does not know the size of his bill, nor does he pay for energy until the benefit derived from its use is over. This gives rise to a feeling that the energy is very costly and to a determination to use less in future. The undertaker is in a similar position, as not even the special costs are known until the supply has been given.

Bulk supply accounts for about half the annual expenditure, though this ratio depends on the policy of the undertaking. If bulk supply is ignored, about seven-ninths of the remaining expenditure is general to the whole body of consumers and, consequently, is not subject to accurate costing. The cost per kWh of bulk supply falls as the load factor increases, though the reduction is smaller as the load factor improves. The improvement in load factor at a higher consumption per consumer is rapid at first, but soon falls away, and, except under special circumstances, load factors much above 30 per cent. seem unlikely. It appears therefore that bulk supply costs per kWh soon become almost stationary after the initial benefit has been secured.

The first method of spreading the capital charges is to sell off-peak energy. Assuming this has been done, extra load can only be obtained by an increase of demand, either by strengthening existing distributors or by extending the network. As additional copper is put down the capital costs per kWh per annum decrease, though each fall is preceded by a long period during which the costs are above those obtained with the smaller cable. The conclusion is drawn that electricity distribution concerns are not subject to the law of falling costs except during the first few years.

A three-part tariff, consisting of an annual fixed charge plus a kilowatt charge plus a "unit" charge, is the only one which gives a true reflection of the costs. Such a tariff is not popular with consumers, and, in devising alternative tariffs, it is necessary to frame them so that the network is employed to the best advantage. Low-priced units improve the consumption per consumer, but leave a smaller margin per kWh-year between the cost of bulk supply and the revenue received. The difference is approximately £65 at a selling price of 10d. per kWh, and £3 at a selling price of ¼d. In general, however, no tariff should be quoted which gives a revenue of less than the special costs incurred, and if the tariff does not cover the full costs, including capital charges, it should be possible for the undertaker to withdraw it at short notice.

The Benson Boiler at Sub-critical Pressures

THE paper entitled "The Influence of the Benson Boiler on the Development of Power Stations," by Mr. F. Ohlmüller, which was referred to last week, was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 15th.

Opening the discussion, Mr. T. Roles said that the English Electric Co.'s experience of the Benson boiler had led to the conclusion that a more robust and less highly strung child would have had better commercial prospects. As a result of the change of air from Rugby to Germany, however, it seemed to have grown robust. The paper did not contain any results of practice, but merely suggestions as to what might be done in future. His high-pressure plant at Bradford had given less trouble than many lower-pressure ones.

The presence of a drum was not a disadvantage, in fact, he would favour more water storage rather than less. Normal types of boiler had shown themselves to be suitable for operating at pressures up to 1,800 lb. per sq. in., and therefore some

very good reason would be required for changing over to an entirely different type. The Benson boiler's efficiency was not higher, nor was its maintenance less, but its capital cost was both remarkable and attractive.

How much of the whole plant was included in the tenders mentioned in the paper? The author's remarks on the deposition of salts contained in the feed water might have some bearing on superheater trouble experienced at Bradford, which had all been confined to the first pass, not the hottest part.

Mr. A. G. Bugden spoke of the first sponsors of the Benson boiler, and detailed the results which followed the splitting of a tube to show that even at so high a pressure this type of boiler was an entirely safe device. When pure water was used there was no trouble with tube burning. The possible influence of the Benson boiler on power station design might be gauged from the fact that after twelve years of development only five such boilers were in use to-day.

Mr. W. M. Selvey remarked that the appearance on the turbine blading of salts which came over from the feed water was one of the earliest troubles, and it still persisted. The objection to flash boilers in general, with one possible exception, was that whatever went in with the feed water eventually entered the turbine. The author seemed to suggest that all these salts might be made to adhere to the heating surface. Was that correct? When the governing was transferred from the turbine to the water and fuel end an entirely new field was entered in which past experience was of little value, and experiment must commence afresh.

The Benson boiler could not have much influence in this country with the grid established as it was. But the peak-load problem would assume quite a different aspect if and when electrical heat storage at night was developed.

Mr. W. S. Burge compared the maximum cycle efficiencies of the Benson, American high-pressure, and British medium-pressure boilers in order to indicate that the real crux of the question was the amount of power absorbed by the feed pumps. Was the author's variable-pressure plan based on an inherent belief in its virtue, or was it merely an expedient to avoid the excessive feed pump losses?

He doubted whether any better efficiency could be obtained by the use of critical-pressure boilers. They had almost reached the parting of the ways between heat storage in drums and no drums. In future they must look to cost and ease of operation. One Swiss type of boiler seemed to have a future, since it was of smaller weight and bulk and quite safe at any pressure.

Mr. N. C. Bridge could not see how the Benson boiler could influence power station design at the moment. Designers had not taken to the flash type. Mr. R. P. Wallis showed how first designs had been modified by evolution. For marine work with high gas velocity gilled tubes might have advantages over plain ones in the convection parts of boilers.

Mr. C. W. Pratt remarked that the author's suggestion to increase the duty by raising the pressure would mean greater first cost because the boiler, fans, and auxiliary plant would need to be large enough initially for the final capacity.

Mr. F. Ohlmüller replied in English, and re-emphasised the safety of Benson boilers and their satisfactory service on land and at sea. With a feed water purity of 10 milligrammes per litre tube trouble due to salt settling was avoided.

Interior of a one-roomed flat in the Sloane Avenue Mansions, S.W., and (right) the convenient situation of the switch and fuses. **(See page 282)**

Super-voltage Joints and Terminations

AT a meeting of the London Local Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION, in London, on February 12th, Mr. T. R. Scott, of Standard Telephones and Cables, Ltd., lectured, with the aid of lantern slides and exhibits, on the mechanical and electrical problems associated with the design and operation of cable terminations and joints. He emphasised that the maximum value of hydraulic head to which an end bell was submitted should be strictly limited. On the other hand, the electrical strength of a termination was greatly reduced by low hydrostatic heads, and therefore the minimum value of the hydraulic head must also be kept at a safe value. Combining both points of view, therefore, Mr. Scott said it appeared to be inevitable that some device, such as a syphon or bellows pressure regulator, must be used to keep the hydrostatic head within safe values.

In contrasting the various methods of making up cable terminations a claim was made for the superiority of the condenser cone, with particular reference to its use on the Central Electricity Board system at 33 kV in the Mersey Tunnel.

A new type of joint bearing the name "Styrene," and referred to as "polymerised," was described. It is of normal construction in so far as the application of the paper tapes is concerned, but the impregnating and filling compounds are a mixture of special hydrocarbons which, on heating, polymerise into a solid mass of very high dielectric strength. At the same time the surface between the tapered insulation of the cable and the newly applied insulation to the joint is totally eliminated as if by a welding action. This type of joint, it was pointed out, automatically acted as a stop or barrier joint provided a solid ferrule was employed. Life tests on such joints had been made over a period of months, followed by breakdown tests, and in no case had it been found possible to break down a joint. The cable attached to the joint was in every case the weaker member of the system.

Opening the subsequent discussion, Mr. D. A. S. Porteous, the chairman, said the condenser cone seemed to be an ideal arrangement for producing uniform voltage drop. He suggested the possibility of making use of the homogeneous material used in the "Styrene" joint in cable manufacture, assuming that it had the necessary mechanical properties, because it would do away with a number of cable problems. The author explained that the "Styrene" joint had not been developed in time to be used in the Mersey Tunnel, but only six or seven months ago. He did not claim that the final mechanical design of the joint had been evolved. He looked forward to a simpler design.

Mr. Riley said he had been in touch with the development of this joint during the past four or five years, and confirmed the statement that it was beginning to effect considerable improvement in cables. It was first developed to serve as the insulation on one part of submarine cables. He inquired whether in hardening and setting the compound left voids in the insulation through shrinkage. The author replied that volume change was so small that it could not be detected.

Mr. Morley said that if this joint could be made without the supervision of a chemist or a specialist, it seemed to be the solution of high-voltage cable jointing. Mr. Scott said that the joint could be applied to cables of the Hochstädter or belted type, and there were no difficulties with regard to heating for jointing purposes.

Correspondence

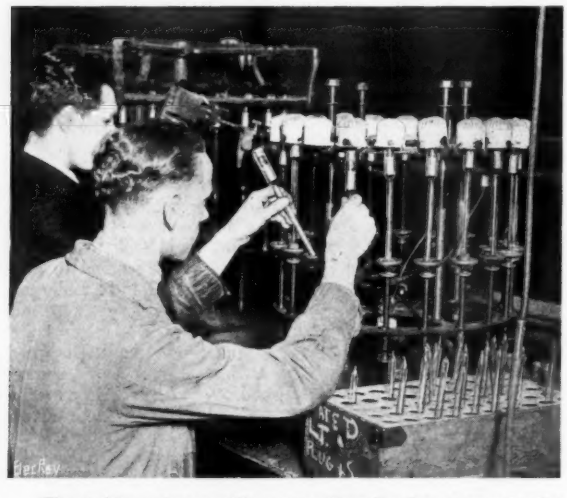
Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

What is Wrong with the Telephone Service?

The announcement by the Postmaster-General of a new class of telephone service for the public to be known as the "group service" once again will focus attention on the charges that the public still has to pay for this method of communication. The "group service" consists of another "party line" system, but with the difference that secrecy of conversation is afforded. Certain inherent drawbacks are, however, already apparent with the group idea, such as (a) no fewer than four or more than eight subscribers can be connected to one group; (b) such subscribers must all be situated near to one another; and (c) no conversation or service is possible between subscribers connected to the same group.

Furthermore, the bogy of high charges still exists, as the minimum tariff works out at £6 per annum for business premises and £3 10s. per annum for residences, with the cost of calls as an additional expenditure. Extra charges again apply where the control or group point is more than two miles from the exchange, and yet again where a subscriber's premises happen to be situated more than 176 yards from the control point.

With regard to the apparatus in use, it should be pointed out that for the first time in this country's telephone history a switching apparatus is to be fitted at the top of each control



The baking process after cementing the brass caps to the electrodes. (See "Neon Sign Production," page 264)

pole, exposed to all weather and temperature effects, although the containing box is to be made as dry and airtight as possible. Trouble is bound to arise in connection with this outside apparatus, corrosion being inevitable sooner or later, which means that group subscribers will suffer accordingly. In all previous instances telephone switching apparatus has been fitted inside the telephone exchange itself.

Having been associated with the public telephone service actively for more than eighteen years, including actual staff work for a period of eight years in the Post Office Telephone Department, I still claim that our telephone service is a long way behind other countries for cheapness and efficiency. The Post Office engineers have not yet produced a real and efficient simple and exclusive line service that meets the average citizen's requirements in pocket and practice, despite all the research and financial opportunities that have been afforded them for years past by a Government department, free of competition and profit-making influence.

I can recall that as far back as the year 1900 the then National Telephone Co. offered an exclusive line telephone service at a rental of £3 10s. per annum and a penny per local call, trunk calls, of course, being additional charges, the tariff applying to premises within a mile of the exchange.

I submit that the tariff just quoted is the one that the public wants, and, furthermore, there is no practical reason to-day why such a system should not be brought into use at once if the efficiency of the telephone service is to be given the foremost consideration. From an inside knowledge, however, of the Post Office Telephone Department, I assert that as long as the administration costs remain as they are at the present time, overloaded with red tape, numerous forms and registering systems, and the multiplicity of officers, the public will never get either a cheap or efficiently managed service.

In the old days of the National Telephone Co. the sequence of its administration of affairs was as follows: the public first, the company second, and the staff last. Under the Post Office administration, however, the order has been reversed. All the official has to do is rigidly to follow the rule book regardless of consequences. A reasonable and cheap telephone service tariff will never come about until half the present organisation has been jettisoned. In this direction the existing Telephone Advisory Committee can get to work at once. My question is: Will it? H. W. HAYDON.

Gloucester, *February 19th.*

Distribution Statistics

It is often stated that actions speak louder than words. I think, too, that statistics are equally as informative. I have taken the trouble to write down a number of statements and statistics obtained at random from a recent I.E.E. paper. It was a paper read in most centres in Great Britain, and, at the time, created much discussion.

Statistics are never monotonous, and from time immemorial have been relied on as a guide to tell of progress, failure, and problems which are only revealed in the logical conclusions drawn from figures. The following statistics and statements, therefore, can be attributed to any of these headings, and if they reveal problems requiring solution—well, there is no time like the present.

"Generation capital is increasing at the rate of seven million pounds per annum, and the distribution capital at the rate of eighteen million pounds per annum."

"There are to-day 663 separate distribution authorities in Great Britain with an average distribution capital of under £300,000."

"Figures indicate that when a suitable tariff is introduced domestic supplies increase rapidly."

"Average small households of four to five persons will consume approximately 2,000 units per annum for lighting, cooking and ironing, and between 5,000 and 6,000 units per annum if electricity is used for all purposes."

"The number of inhabited houses in Great Britain is approximately 11 millions, and it is estimated that only 3.3 millions are at present served by authorised undertakers."

"It has been found that whereas in a scattered suburb some distance from the town the cost of giving a supply works out at £44 per consumer, there being thirty-nine consumers per 1,000 yards, in a populous suburb the corresponding figures are £22 per consumer and 103 consumers per 1,000 yards. £44 per consumer is not high as an average figure. In some areas it has been known to be as high as £110."

"Increase in units sold per £ of capital employed in generation is due to large generating units now used costing less per kW installed with a usually higher load factor. . . . Fifty-seven per cent. of plant in generating stations to-day is in units of 10,000 kW or upwards."

"Thirty-six million of Great Britain's population live in areas where electricity can be obtained. Of this number 30 millions can obtain electricity on a two-part tariff at 1d. per unit or less, 20 millions at ¾d. per unit or less, and 10 millions at ½d. per unit or less. . . . Nearly 350 undertakings are selling electricity at 1d. per unit or less. . . . In Lancashire 80 per cent. of the supply undertakings have a two-part tariff, 70 per cent. assisted wiring schemes, and 50 per cent. have a unit charge of ¾d. or less."

"Approximately 600 units per annum per consumer is the average consumption of the domestic consumer. . . . A number of undertakings after twenty-five years of operation are still selling less than 60 units per head of population . . . In 1930-31 out of 624 undertakings, 236 sold less than 50 units per head of population, 352 less than 100 units per head of population, 508 sold less than 200 units per head of population, and only 116 sold more than 200 units per head of population."

"The demand per head of population in Great Britain is 230 units per annum approximately. . . . The average connected load is little more than 300 watts."

I am wondering if some of the above points have been duly framed and hung on the walls of engineers' homes in the same way as Biblical texts were treated in days gone by. If these were considered to be necessary reminders to help us in an imperfect life, then the text of the problems apparent to-day in the supply industry and contained in that paper might be taken to heart by engineers and managers in much the same way.

Walsall, *February 19th.* A. R. CROSS.

British Inventors

While thanking you for inserting my letter in your issue of February 16th, I regret to note that through a typist's error I stated that seventeen years' registration could be obtained in *any* state of the U.S.A. for £7 down. This sentence should have read "in *every* state of the Union," as, of course, a patent in the United States is a Federal affair, and covers their whole territory. G. WATSON.

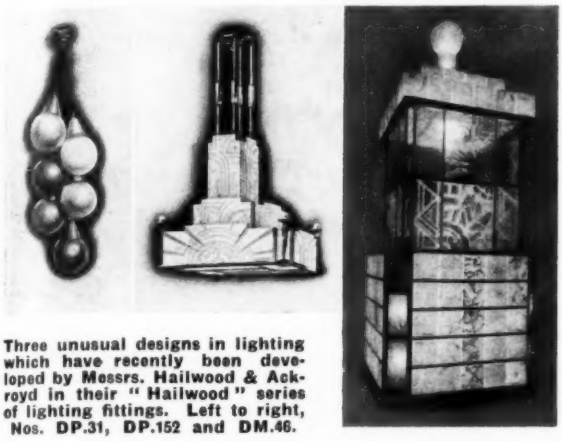
Caterham Valley, *February 17th.*

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Decorative Lighting

The accompanying illustration shows three recently introduced "Hailware" fittings. Of especial interest is the illuminated tower (D.M.46) which incorporates flake cubes and



Three unusual designs in lighting which have recently been developed by Messrs. Hailwood & Ackroyd in their "Hailwood" series of lighting fittings. Left to right, Nos. DP.31, DP.152 and DM.46.

deeply engraved, coloured glass panels. The metalwork can be obtained with aluminium, bronze, or chromium-plate finish. The manufacturers are MESSRS. HAILWOOD & ACKROYD, Morley, Nr. Leeds.

A Revo Imitation Coal Fire

The latest fire to be introduced by the REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, Staffs, is known as the "Fyrelite" and costs £2 1s. It is massively built of cast-iron and sheet metal and houses two 1-kW "Challenge" firebars each controlled by a separate switch. The "coal" is made in one piece of coloured glass which permits the filtered light from the lamp beneath it to cast a flame and smoke effect upon the well of the fire.

The Revo "Fyrelite" imitation coal fire

The bars are set at such an angle that they emit heat upwards and outwards in a wide arc. The dimensions of the fire are 17¾ in. high by 14 in. wide by 8¾ in. deep, and the weight is 26¾ lb. Sprayed oxidised brass, silver or bronze finishes are available, and the price includes two yards of three-core flexible cable and the lamp for the flame effect.

The B. & Y. Iron

A special feature of the new "B. & Y." iron, a new product of MESSRS. BERKELEY & YOUNG, LTD., Tyseley, Birmingham, is the balance to eliminate fatigue, and the new moulded handle which is fitted instead of a wooden one. Two yards of Henley "Thermoid" flex and a side entry connector are fitted as standard, although two yards of three-core "Thermoid" can be obtained at the same price. The weight is 5 lb., the loading 450 W, and the price 10s. 6d. finished in nickel plate, or 12s. 6d. in chromium.

The new B. & Y. iron

A Fire-resisting Control Cable

A special type of multi-core control cable was recently supplied by BRITISH INSULATED CABLES, LTD., to the Sydney City Council for the circuit between a miniature type control board and a relay and terminal board in the Pyrmont power station. It will also be used in connection with the remote control of oil circuit-breakers and for metering and relay protection.

The conductors are of 19/.022-in. tinned copper, insulated with a felting of asbestos applied under the "Rockbestos" patent, served with helically wound, varnished cambric tapes over which a further felting of asbestos insulation is applied. Each core is then covered with a coloured cotton braid for coding purposes, the required number of cores being laid up together, and wormed circular with jute. Over the laid-up cores is applied a belt of varnished cambric tape held in place and protected by an asbestos braid compounded with a black moisture-resisting and flameproof compound. The completed cable is protected by an armouring consisting of an open braid of galvanised steel wire.

The advantages claimed in comparison with ordinary control cable are that its fireproof properties enable the special cable to operate breakers and relays in case of fire, and that the asbestos insulation will not deteriorate with age.

A Two-rate Meter

MESSRS. VENNER TIME SWITCHES, LTD., Kingston By-pass Road, New Malden, have introduced a new Venner two-rate meter which embodies an unusual form of change-over mechanism, the whole arrangement being compact, easily accessible and economical in price. Briefly, it consists of a single-phase meter element with a double dial counter for the high and low rates which is changed over by a Venner self-starting synchronous motor clock, all mounted in one case with a standard four-way terminal block. The case is provided with a sealable door opposite the clock to facilitate alteration of the time settings. The dial of the clock can be fitted with two or four hands so as to change the dial over from high rate to low rate and back again once or twice a day respectively. An indicator is fitted to show whether the high or low rate is in force.

The Venner two-rate meter

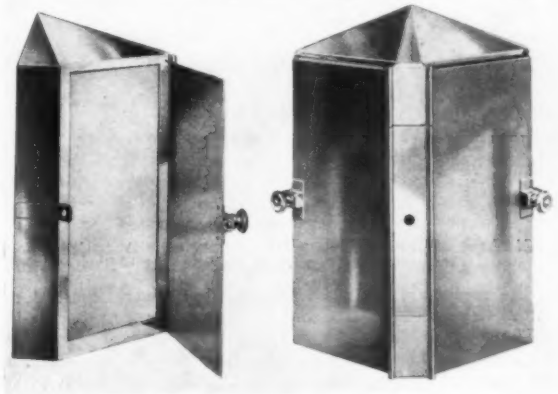
The double dial counter is of a new type in which there are always the same number of wheels running irrespective of whether the high or low rate is in action. No idler wheels are employed and there are only the same number of wheels running as in an ordinary counter. The synchronous motor clock changes the counter over mechanically, and the train which is not in action at the moment is definitely locked so that it cannot move.

An Architectural Lighting System

A description of a new lighting system introduced by STRAIGHT-LITE REFLECTORS, LTD., appeared under the above heading in our issue of February 9th. In this we stated that the damp-resisting sleeve "will withstand 5,000 deg. F." This should have read "500 deg. F." We are also informed that the lamps are 10 in. long, the reflectors being 11 in. long. The forty 30-W lamps which can be placed end-on are for 200/260-V supplies. On 100/130-V supplies only twenty 30-W lamps or ten 60-W lamps may be run off one pair of conductor wires: the two wattages have a light intensity of 288 and 640 lumens per foot respectively.

Bedroom Reading Lamps

A new type of reading light for use in bedrooms with twin beds has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. The fitting has two doors which enables the occupant of either bed to read by the light



G.E.C. bed-light fittings

of this single unit. When both doors of the fitting are closed the illumination through the small orifice shown in the right hand picture provides a nightlight. A large number of these fittings have been installed in the new Cumberland Hotel, Marble Arch, W.

B.I. Static Condensers

For the elimination of static interference BRITISH INSULATED CABLES, LTD., Prescot, Lancs, have introduced a range of small static condensers specially arranged with a centre tapping. Condenser units are available with capacities of 2-4, 2-10, 2-20, and 2-40 mfd., in series, at 10s., 18s. 9d., 36s. 6d., and 68s. 6d. respectively; these are suitable for motors up to 10, 20, 40 and over 40 h.p. respectively.

A centre-tapped B.I. static condenser unit

A Rotary Phase-shifting Transformer

This new Zenith transformer has been designed with the object of producing at a reasonable price an instrument of high electrical accuracy in combination with robust construction. It provides convenient means for adjusting the phase angle or power factor in a.c. circuits, when testing single- and three-phase service meters, wattmeters or power-factor indicators. It comprises a wound stator and rotor similar to an induction motor, the windings of which are brought out to terminal panels to enable their use either in "star" or "delta" connection, so that any transformer can be operated on two alternative three-phase voltages and furnishes two alternative outputs. All windings are distributed sinusoidally to a high degree of precision, and the magnetic circuit is so arranged that if the stator is supplied from a three-phase source of sine wave form, the secondary output wave form derived from the rotor will suffer no distortion at any power factor or load within the capacity of the instrument.

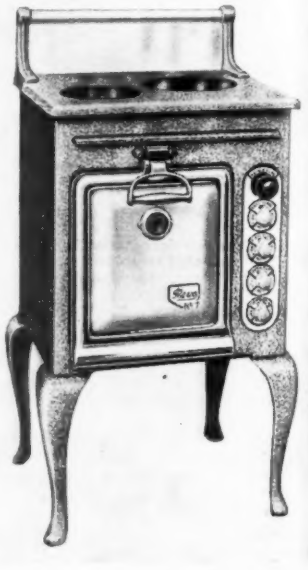
The Zenith rotary phase-shifting transformer

Very fine regulation is effected by means of a worm-gear, and a double-ended pointer in combination with a large diameter scale indicates simultaneously the angle of lead or lag in electrical degrees and the power factor. The pointer operating on the degrees scale is specially shaped and calibrated as a vernier. The rating is 600 kVA.

The manufacturers are the ZENITH ELECTRIC CO., LTD., Villiers Road, Willesden Green, N.W.2.

"Dominion" Cookers

The REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, Staffs, has introduced this year a new range of cookers specially designed for export, which are being exhibited at the British Industries Fair. There are three models, Nos. 7, 9 and 11. The smallest has a hob with two boiling plates of 8 in. and 6¼ in. diameter, loaded at 1,500 W and 900 W respectively; the other two models have in addition an 8½ in. hotplate, although in all cases the 8-in. boiling plate can be replaced by a "Superspeed."



The smallest Revo "Dominion" cooker

A drip tray is provided, and the measurements of the oven are 11⅝ in. wide by 13¼ in. deep by 11½ in. high. Models 9 and 11 both have a larger oven, measuring 16 in. by 17 in. by 13½ in., and heated by two 2,500-W elements, whereas the elements of the small cooker are loaded at 1,900 W, the top element being of the open type and serving as a griller or boiler. A spring-loaded drop door forms a convenient shelf when it is open, and separate switches are provided for all elements. A kettle plug is provided.

The overall dimensions of the three models are as follows: Model 7, 22½ in. wide by 17 in. deep by 34½ in. high; model 9, 27¼ in. by 20¼ in. by 34½ in.; model 11, 49 in. by 21 in. by 51 in., with splash plate.

An Improved Disconnecting Box

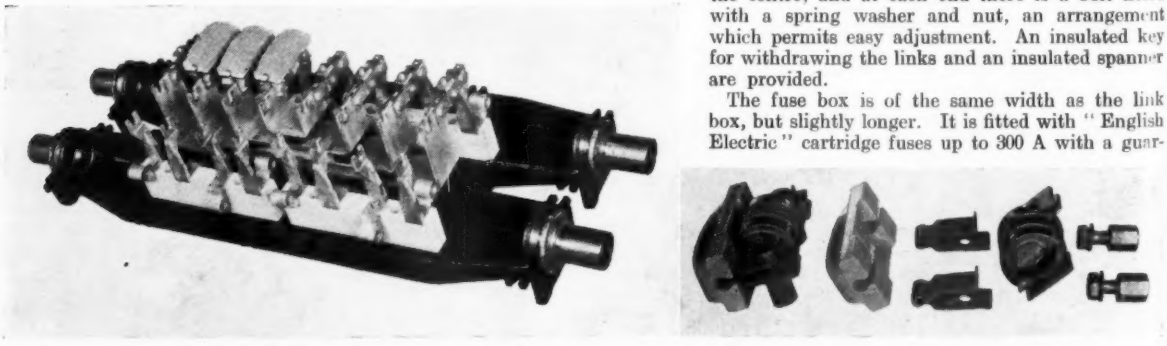
A NEW low-voltage cable disconnecting box which Messrs. Siemens Bros. & Co., Ltd., are placing on the market has been designed to ensure the greatest possible ease of jointing and installation in cramped positions. An outstanding feature of this link and fuse box is that it is exceptionally narrow, thus needing the minimum width of space underground. To secure this the cable fittings are mounted in line, behind each other, instead of side by side across the width of the box.

An even more important advantage is the ease with which the jointing can be done. The cable fittings remain in position on the insulated base until such time as the sweating of the conductors into the fittings has to be carried out. Each individual cable is completely jointed before commencing the next cable. In the event of a pressing job, there is sufficient room for one jointer to finish the two cables at one end, and for a second jointer to complete the other two cables at the opposite end of the box simultaneously.

The cable fittings are made in groups of four, the cable sockets of the fittings in the group being set at different levels. Each fitting is separate and interchangeable, and reversible, in order to give a choice of position most suitable for the lay of the cable cores and to avoid unduly bending them, the maximum set of any core being 45 deg. All the cable fittings are made in one piece, so that there are no bolted joints under compound. The bus-bars are made up to form one unit, so that they are easy to remove for jointing, their correct position being registered by two raised pins.

The company's spring links are supplied; each is double bladed with a spring washer connected between the blades at the centre, and at each end there is a bolt fitted with a spring washer and nut, an arrangement which permits easy adjustment. An insulated key for withdrawing the links and an insulated spanner are provided.

The fuse box is of the same width as the link box, but slightly longer. It is fitted with "English Electric" cartridge fuses up to 300 A with a guaranteed rupturing capacity of 25,000 kVA. All electrical fittings are tinned and are made from high-conductivity copper. The insulated bases are of unglazed porcelain, but "Sindanyo" bases can be fitted if necessary. Ebonite screens, which dip slightly into the compound, separate the phase fittings above the compound. Coloured phase indicators and cable destination indicators are provided.



Siemens improved disconnecting box. (Left) an interior view showing arrangement of fittings, (right) the English Electric cartridge fuse showing the fuse assembled and in parts, illustrating the ease of assembly

Registered Electrical Contractors

The inspecting engineer's first report

THE report of the Executive Committee of the National Register of Electrical Installation Contractors for the year ended December 31st last, says that both income and expenditure show increases, the largest item of increased expenditure being £591 for inspections carried out by Mr. H. C. Hazel, who has been acting as full-time inspecting engineer since April 3rd; this sum includes £339 for travelling expenses, the remainder representing salary.

Applications for registration received in 1933 numbered 314, of which 150 were accepted, and sixty-eight declined or withdrawn, leaving ninety-six still under investigation. Failure to renew registration was responsible for the removal of 146 names from the register, among other reasons for the cancellation of registrations being bankruptcies, liquidations, deeds of arrangement and assignment, etc. (117), death, resulting in the closing down of business (106), bad workmanship (9), breaches of rules (8), and unsuitable business premises (1). At December 31st there were 1,694 on the register, an increase during the year of 131; by February 2nd, 1934, the number had risen to 1,719.

Five contractors appeared before the Executive Committee as the result of complaints received. Three were struck off the register, and two were retained on the register after having given satisfactory undertakings regarding their future work.

The chairman then moved a resolution providing for the amendment of Rules 7 and 13. The first covered the increase of fees mentioned above. The hon. treasurer (Mr. W. R. Rawlings) "opened his Budget" for the current year. He thought it possible that the raising of the fees might lead to a reduction in the number of registrations and renewals, so he had worked on a basis of 90 per cent. of the existing number. On this calculation he showed that the revenue would increase from about £3,000 to £4,027. There would be an increase in the cost of the inspection service and in the remuneration of the staff, but, in spite of this, he anticipated a surplus of £566, against £457 for the past year.

Unduly Pessimistic?

Mr. F. W. Purse considered that Mr. Rawlings had been unduly pessimistic in his calculations. He, the speaker, felt certain that any falling-out of present registered contractors would be compensated for by new registrations. In reply to questions the chairman said that the increased fees would come into force as from May 1st, and it would be necessary to hold a confirmatory meeting before that date. The amendments were approved unanimously.

The alteration to Rule 13 gave power to the Executive Committee to require the return of all certificates of registration

The Underground Railways of London have provided many excellent examples of lighting combining art and utility. The new Knightsbridge station which is illustrated above fully maintains the high standard set by earlier installations

At the request of the Institution of Electrical Engineers all registered contractors and applicants for registration are being urged to use standard plugs and socket outlets, and also to make sure that switches are placed on the live pole of a circuit.

To enable the work of inspection to be extended, the Committee recommends that the application fee should be raised from £5 to £5 5s., and the annual renewal fee from £1 to £2 2s., the fee for registration and renewal of branch establishments also to be raised from £1 to £2 2s.

The report concludes with an appreciation of the services rendered by the members of the Local Advisory Committees, the chairman of the Executive Committee, Mr. P. V. Hunter, and by Messrs. H. J. Cash and E. Calvert, who, in addition to acting as scrutineers, have dealt with the reports of all inspections made.

The accounts show an increase for the year of £2,999 (against £2,601), and an expenditure of £2,542 (£2,036), leaving a balance of £457 (£565). Investments at cost are given as £6,373.

The Annual Meeting

Mr. P. V. Hunter, C.B.E., the chairman of the Registration Board, presided at the annual meeting on February 16th. The report and accounts were adopted after a brief discussion, in the course of which Mr. W. R. Rawlings proposed (with general approval) that the services of Mr. A. H. Dykes as vice-chairman should be recorded in the report.

The nomination to the Board of Mr. J. S. Dow, as representative of the Illuminating Engineering Society in succession to Lt.-Com. H. T. Harrison, was approved. Messrs. Hunter and Dykes were re-elected chairman and vice-chairman respectively, and the retiring members of the Board—Messrs. E. Calvert, W. H. Walton and F. W. Purse—were also re-elected unanimously, after expressions of appreciation had been made.

and dies or blocks of the Register's device. Mr. Hunter explained that it had been rendered necessary by the difficulty of securing the return of branch registration certificates. This amendment was also approved.

The chairman then proposed that the usual subscription of five guineas should be made to the I.E.E. Benevolent Fund, but on Mr. Rawlings's suggestion the amount was increased to ten guineas. Mr. Rawlings said that the Register was indebted to the Institution for placing its premises at their disposal for their meetings.

The proceedings concluded with votes of thanks to Messrs. Hunter and Dykes.

Mr. Hazel's Work

The Register has published a report upon the inspection of the work of registered contractors carried out by the inspecting engineer, Mr. H. C. Hazel, who was appointed last year. This enumerates under twelve headings the types of faults which have been disclosed, many of which are said to be due to ignorance of proper wiring practice and of the I.E.E. Wiring Regulations. In some cases the responsible persons concerned were well aware of what constitutes good wiring practice and faults which were discovered were due to inadequate supervision.

Five types of letter have been produced to meet various classes of delinquencies and typical replies to these are reproduced in the report. The inspector has covered a wide area, a list of forty districts which he has visited being given in the report.

Altogether the work of 255 contractors was inspected during the period of nine months. Of these inspections thirty-three were concerned with the work of new applicants while another thirty-three were considered satisfactory. It was necessary to send letters to 171 contractors. The explanations of seventy-seven of these were accepted; forty-six undertook to improve

their work; repeat inspections were ordered in twenty-two cases; six were guilty of only minor departures from good practice; in seventeen cases the replies were still under consideration; and it was necessary to strike three contractors off the Register.

The Executive Committee says that it is not its intention or desire to use inspectors as a means of, or a reason for, striking contractors off the Register. On the contrary they are designed to bring home to the contractor his faults, show him how to avoid them in future, and thus raise the standard of installation work generally so that the public and purchasers of installations and those who have the placing of contracts will know that a registered contractor is not only under an obligation to do good work but knows what good wiring work is and how to secure it. The inspection service is to be extended and developed.

The Electrical Wholesalers' Dinner

THE annual dinner of the Electrical Wholesalers' Federation was held on February 15th at the Savoy Hotel, Mr. D. Foster, president, occupying the chair. Mr. Gordon Selfridge, in proposing the toast of the Federation, said that the electrical industry was the world's key industry, and practically all other industries were dependent upon it. This being so, there must be others outside the industry desirous of selling electrical merchandise. It was a good idea for the house-furnisher, decorator and ironmonger to sell electrical goods, as it created much more public interest in what the electrical industry had to sell. No branch of industry had made greater strides than distribution, and retail distribution was a fairly recent creation which had come to stay and would expand.

Mr. D. Foster, in responding, said that the Federation was stronger and of more use to members and the trade than at any time in its history, and the reason was to be found as much outside the Federation as inside. Manufacturers brought their troubles to the Federation, and the contact enabled them to be of service to the manufacturers and the industry as a whole. Sir John Brooke had recently spoken of the millions of profit that would accrue to the industry, but there were people outside the industry who had an eye on the profit to be made. They had got to decide how far these invasions were good for the industry. With the completion of the grid the limelight would be switched from the manufacturers to the retailers of electrical accessories.

Many supply authorities and manufacturers must have found it one thing to have a showroom and another to get a customer into it. It was in the retail shop that the public should be confronted with the apparatus that the industry wanted to sell. The showroom should fade into the background and electrical goods go into the trader's window. He paid a tribute to the pioneer work of the supply authorities in nursing the development of electrical accessories and the hire-purchase idea, but was that enough? The industry should not rely upon the authorities as the heaven-sent means of the distribution of its products. He congratulated the contractors on their decision not to oppose the extension of retail distribution and they should benefit extensively. The widening of retail distribution was necessary to the expansion of the electrical industry, and the retailer must be adequately served. An increase of wholesale distribution could have no good effect on retail sales, and therefore was not justified. The wholesalers must organise to give the market efficient service, but while they organised for expansion they must not get in each other's way.

In proposing "Kindred Associations," Mr. A. Albrecht welcomed the presence of Sir William Ray, whose task as executive chairman of the E.D.A. was, he said, a difficult one; he had the right to expect the support of every section of the trade. Their relations with other associations were excellent, and he expressed his thanks to the small body of men who gave their time and money to the better regulation of the trade.

He asked that the idea of one section of the trade exploiting another section should be banished from their minds. If they bore in mind that they must pay attention to distribution, they would have taken a step towards the realisation of the changed conditions of industry. The kindred associations must play a larger share in the future life and success of the electrical industry. The principal hindrance to progress was the fact that many traders had no use for associations.

Sir William Ray, in responding, said the success of the industry could not be brought about without the consultation and co-operation of all. He realised that, so far as the work of E.D.A. was concerned, the whole industry must be brought together in some way if their hopes were to be achieved. With mutual goodwill, concentration and co-operation, and with every organisation pulling its weight, nothing could stop the progress of the electrical industry. It would be his endeavour, with their help, to see that things went along in a harmonious manner. He believed the country was returning to prosperous conditions.

British Overseas Electrical Trade

THE statistics compiled by the Board of Trade relating to the overseas electrical trade of the United Kingdom during January have just been published in their new and more comprehensive form. It will be seen from the table on page 285 that several new classifications have been introduced.

A new feature which is likely to be of great value to manufacturers in search of new markets is the publication of figures showing the destination of some of the principal classes of exports. The most important of these figures are reproduced in the right-hand column, and the remainder may be briefly analysed as follows:—

Destination of rubber-insulated electric wires and cables (not telegraph or telephone) during January, 1934, with the January, 1933, figures in parentheses: South Africa, £11,852 (£13,661); British India, £16 175 (£15,027); Australia, £15,288 (£15,287); New Zealand, £2,904 (£2,343); other British countries, £13,794 (£7,351); foreign countries, £7,409 (£5,581).

Insulated electric wires and cables (insulation other than rubber): South Africa, £17,106 (£5 812); British India, £16,080 (£12,704); Australia, £9,683 (£7,725); other British countries, £10,321 (£6,730); foreign countries, £8,289 (£6,894).

Telegraph and telephone apparatus (other than radio): South Africa, £14,944 (£22,532); Australia, £8,962 (£3,125); Canada, £392 (£896); other British countries, £7,595 (£11,246); Argentina, £3,077 (£3,099); other foreign countries, £51,044 (£76,751).

The imports of electrical goods and apparatus, amounting in value to £900,337, came from the following countries (January, 1933, figures in parentheses): British countries, £5,659 (£8,192); Germany, £62 923 (£57,311); Netherlands, £36 657 (£26,071); Pelgium, £5,314 (£6,096); France, £8,765 (£9,356); Switzerland, £15,633 (£14,225); Austria, £12,804 (£9 488); United States, £32,318 (£26,752); other foreign countries, £20,264 (£19,052).

The statistics no longer give the re-exports in detail. The total value of electrical goods and apparatus re-exported last month was £11,642, which compares with £19,347 in January, 1933.

EXPORTS AND IMPORTS DURING JANUARY

	Exports. Exports for Jan., 1934.	Exports. Inc. or dec. as compared with Jan., 1933.	Imports. Imports for Jan., 1934.	Imports. Inc. or dec. as compared with Jan., 1933.
Submarine telegraph and telephone wires and cables ...	£5,455	+ £1,252	*	
Telegraph and telephone wires and cables (not submarine)	39,389	+ 24,526	*	
Other insulated wires and cables	128,901	+ 29,786	£17,001	— £1,072
Radio receivers (excluding valves)	26,975	+ 8,144	5,315	+ 3,714
Radio transmitters (excluding valves)	21,203	— 1,837	*	
Radio valves	26,868	— 16,079	20,264	+ 5,757
Other radio parts and accessories	45,269	+ 2,350	37,800	+ 9,692
Telegraph and telephone apparatus (other than radio)	86,014	— 31,635	*	
Elec. carbons...	*		12,317	— 2,374
Incandescent lamps	38,338	+ 6 050	17,303	+ 576
Other lighting apparatus ...	28,907	+ 6,214	17,643	— 2,089
Primary batteries	12,071	— 3,783	594	+ 105
Accumulators...	66,480	+ 21,680	*	
House service meters ...	10,236	+ 4,558)	27,351	+ 1,331
Other elec. instruments ...	10,516	— 2,205)		
Unenumerated elec. goods and apparatus	91,308	+ 17,664	44,689	+ 8,156
Elec. generators, up to 200 kW....	16,352	+ 4,110	*	
Elec. generators, over 200 kW.	67,579	+ 60,932	*	
Elec. motors	71,179	+ 29,798	†19,401	+ 11,896
Convertors and transformers	22,618	+ 8,843	*	
Starting and controlling gear for elec. motors	20,553	+ 7,490	*	
Switchgear	73,517	+ 36,583	*	
Other elec. machinery ...	8,311	— 19,145	9,383	+ 667
Elec. vacuum cleaners ...	*		8,102	— 8,267
	£918,039	+£195,296	£237,223	+ £28,090

* Not classified separately. † Not railway and tramway motors.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Municipal Trading at Blackpool

On behalf of the Fylde Branch of the Electrical Contractors' Association, a protest, signed by Mr. J. L. Schofield (chairman), Mr. P. J. Frampton (vice-chairman) and Mr. A. E. Huddart (secretary), has been issued against the proposal that an electrical showroom shall be established at Blackpool. The protest states that the contractors consider that "the function of the Electricity Department is to supply electricity to the ratepayers at the lowest possible price, and not to burden itself with other costly activities," and points out that Blackpool has several well-equipped electrical showrooms successfully operated by private enterprise. It also claims that Blackpool, without municipal showrooms, has reached the position of being the second largest consumer of electricity per head of the population among seaside resorts.

Scottish Contractors' Dinner

Suggestions for creating employment in Scotland by the development of the heavy electrical industry and the electrification of the railways were made by Prof. G. W. O. Howe, of Glasgow University, when speaking at the dinner of the Electrical Contractors' Association of Scotland in Glasgow on February 13th. Mr. H. G. Mackerron presided over a large gathering. Professor Howe proposed the toast of "Glasgow Corporation" and Bailie J. G. Robertson responded to the toast. Mr. W. J. Cooper, manager of Hamilton Electricity Department, proposed the toast of the Association. The chairman, in replying, drew the attention of those responsible for the planning and laying out of electrical installations in modern buildings to the amount of space allotted to the contractor for the erection of the electrical gear, which was one of the most important factors in the building. He was becoming more convinced every day that the majority of electrical work should be boldly exposed so that it could be seen at a glance what type of job was being installed. Mr. Sam Mavor proposed the toast of "The Electrical Supply," and Mr. William McFarlane, of the Central Electricity Board, replied.

The F.B.I. and British Trade

The Federation of British Industries has submitted to the Government proposals with regard to the future policy of the United Kingdom. The memorandum, entitled "British Commercial Policy," contains arguments for a stronger policy and makes suggestions for combating the difficulties against which British industry is contending, and the possible dangers which may arise in the future.

An All-electric Cinema at Hull

Electricity is used for lighting, heating and power at the Regal Cinema, Hull, which was opened recently. A G.E.C. electrode thermal-storage boiler (Penzold system) is used; this employs time switch thermostatic control of the hot water and air heating of the entire theatre. There are electrically operated ticket-issuing machines, and the exterior is lighted by means of high voltage gaseous discharge lamps. The vestibule and auditorium have concealed lighting, and the clocks, film-winding machinery and fans are electrically driven. Every note and pipe of the organ is actuated by a separate electric wire to its key on the console, which is lifted into view by an electrically driven lift at the touch of a button by the player. All the cooking in the café is likewise done by electricity. The use of electricity as the sole means of fuel, power and lighting in this building is due to the enterprise and the assistance of the city electrical engineer of Hull, Mr. J. N. Waite. The installation was designed by Mr. Basil Davies and carried out under his supervision by Messrs. Booker & Tarran, Ltd., and Messrs. A. J. Snelling.

The Positive Electrical Supplies Co.

In order to avoid any misapprehension in the trade, the Positive Electrical Supplies Co., of 22, Lombard Street, Birmingham, asks us to state that it has no connection with Mr. J. F. Creasey (trading as the Positive Electric Co.), of Manor Park, whose name appeared under "Bankruptcy Proceedings" in our issue of February 9th.

The Ex-British Westinghouse Association

The fifteenth reunion dinner of old British Westinghouse men will take place at the Trocadero, London, on March 16th, under the chairmanship of Dr. Miles Walker, F.R.S. Members who have not received an invitation are asked to communicate with Mr. L. S. Richardson, hon. secretary, 70, Preston Road, Wembley, or Mr. L. S. Hawes, hon. treasurer, 51, Fontenoy Road, Balham, S.W.12.

Tungsten in 1933

The demand for tungsten ores revived during the year, says the *Mining Journal*. This demand, coming on the industry in a very depressed condition, caused a rapid advance in price at the beginning of the second half of the year and the market continued on a much higher plane up to the end of the year. Prices from January to May ruled between 10s. and 11s. per unit and by October had reached 27s., around which price it remained until the end of the year. Quotations from China during the last four months of the year were from 28s. to 30s. per unit, but at these prices practically no business was done. Imports from abroad were as follows: from China, 5,500 tons; Burma, 2,640 tons; Federated Malay States, 1,150 tons; Bolivia, 800 tons; total, 10,407 tons.

There is usually a small output from the United States, Spain, Cornwall and Indo-China, which would probably bring the total up to slightly over 11,000 tons, as compared with about 13,000 tons in 1931 and about 16,500 tons in 1930. These figures are for supplies and do not necessarily correspond with mine output. If prices look like staying permanently above the 25s. mark no doubt production will be considerably expanded in the current year.

Dutch West Indies Import Duty Exemptions

A decree recently issued by the Government of the Dutch West Indies provides for the exemption from import duty of materials for installing, producing or conducting electricity.

A Big American Demonstration Institute

Very impressive, as the accompanying picture shows, is the new General Electric Institute which has been established at Nela Park, Cleveland, Ohio. In it the General Electric Co. (U.S.A.) brings together under one roof its former lighting, kitchen and refrigeration institutes, as a training school for the electrical industry. It is dedicated to the "New Science of Seeing," to the art of illumination for commerce and industry, and to the complete electrification of the American home. A feature of its policy will be to embody all new developments as they come along, thus making it an ever-changing panorama of electrical progress. New devices will be proved and tested there. In its various rooms and show-windows capacious foyer and miniature streets, all kinds of lighting and domestic ideas and applications are demonstrated, and it is designed to be an educational centre for utility employés and sales groups.

The new American General Electric Institute

Japanese Radio Goods in South Africa

A meeting of the South African Association of Radio Industries has resolved that members will not handle radio sets, valves or other components of Japanese origin, and that radio mechanics in the employ of members found servicing such sets will be dismissed. This action follows the sale of Japanese wireless sets and equipment in local stores at prices as low as one-third of those of English and American articles. Most of the spare parts are of standard design, and an example of the prices is that valves normally costing about £1 are sold for 4s. 6d.

Renewal of the German Cable-making Syndicate

Negotiations for the prolongation of the German cable syndicates have made such progress that it is expected a favourable result will be reached before the end of March, when the exist-

ing agreements, which were extended in 1930 for a period of four years, will nominally expire. The combinations concerned are the Low Tension Syndicate and the Association of High Tension Cable Works. Including the four large firms (A.E.G., Siemens, Bergmann and Brown-Boveri), the syndicates comprise twenty-two works and represent practically the whole of the German production of l.p. and h.p. cables. The syndicates are price controlling combinations and each member has a definite quota in the total sales business that is transacted.

A New Siemens Showcard

A striking effect of strength is given by the new Siemens "Full o' Power" battery showcard which we illustrate herewith. The inscription reads "'Full o' Power' for punch and pep," and the battery illustrated is the tapped 120-V "Cadet" type.

A new "Full o' Power" showcard

Electricity at a Domestic Training College

The application of low-temperature heating as an economical fact is exemplified in the recent application of the "Ediswan" tubular heaters in Burridge House, the west wing of the National Society's Training College of Domestic Subjects. In the main section, devoted to training, tubular heaters provide all the necessary heat requirements; but in the cubicles "Ediswan" electric fires are installed, and in the common and staff rooms a small portion of the heat is also provided by the company's fires. In addition to the heating requirements, the hot water supply is also catered for electrically, which in an institution of this kind required very close consideration in order to deal adequately with the demand made upon it for the normal training requirements in the laundry and housewifery sections, and for ordinary domestic requirements of many baths in succession, and for lavatory basins. The building was sectionalised in order to avoid long pipe runs and consequent heat losses, and circulators and immersion heaters were fitted into the supply tanks, which are efficiently lagged to prevent the heavy radiation losses which would otherwise occur. In all, the total connected load is 250 kW, of which 65 kW is for low-temperature heating, 23 kW for water heating, 68 kW for radiant fires, 70 kW for lighting, with a balance for electric cooking, ironing, and other applications. The architects for the scheme were Messrs. Beezley Burrows, Victoria Street, Westminster, S.W.1, and Messrs. G. W. Day, electrical engineers and contractors, Dacre Street, Westminster S.W.1, were responsible for the whole of the electrical installation. Pictures of the College appear on page 273.

Sheffield Electrical Contractors' Dinner

The eighth annual dinner and dance of the Sheffield Branch of the Electrical Contractors' Association and National Federated Electrical Association was held at the Royal Victoria Hotel, Sheffield, on February 16th, Mr. A. J. Ward, the chairman, presiding. Mr. E. Morgan (city electrical engineer, Sheffield) said that in 1913 his department had sold 21 million kWh, and the total of 230 millions sold in 1933 showed an increase of 20 millions over the previous year. He wanted the co-operation of the contractors, whom the Department was helping. Mr. L. C. Penwill (director and secretary of the E.C.A.) said that as an industry they had to be careful because of the cheap and shoddy apparatus sold by people not qualified to give advice. There was real need to press on the Electricity Commissioners the need to safeguard the position. There should be rigid control of installation work.

Ericsson Employés' Hospital Fund

At the annual meeting of Ericsson Employés' Hospital Fund, held on February 12th, Mr. J. Engblom presiding, it was stated that grants totalling £438 had been made to various hospitals and institutions.

Electricity in London Flats

It is a primary requirement in residential flats that the arrangements shall be convenient and free from trouble, and it is therefore not surprising that electricity is being employed in such premises at a rapidly expanding rate. One of the latest examples of this tendency is provided by the Sloane Avenue Mansions, London, S.W., designed for the Central London Property Trust Co., Ltd., by Mr. G. Kay Green. These dwellings comprise one-roomed or two-roomed flats, and they are provided with fires made by G. Wright and Co., Ltd., and Jackson & Belling Cookers, and each flat is wired for a refrigerator. Lifts were installed by Marryat & Scott, Ltd., and the electrical contractors were Drake & Gorham, Ltd. Pictures of the flats are reproduced on page 275. An unusual, but very convenient, arrangement is illustrated, *i.e.*, the housing of the switch, fuses, &c., in a cupboard outside the door of the flat, permitting easy inspection.

New Municipal Electricity Offices and Showrooms

The Electricity Department of the Skelton and Brotton Urban District Council is being transferred from the Council's offices to a separate building where a showroom is to be opened for the exhibition of electrical equipment.

The Tunbridge Wells Corporation Electricity Department on February 1st opened for a period of five weeks an electrical showroom at 24, Mount Pleasant. Daily demonstrations are being given of electric cooking, &c.

Irish Free State Electrical Imports

A very active tone again prevailed in the electrical trade in the Irish Free State during December last, the imports of electrical machinery, fittings, and cognate apparatus attaining a value of £71,938 as compared with 60,193 in December, 1932. The appended table gives details of the aggregate imports during the whole of the past year, from which it will be seen that the total amounted to £791,802, an increase of £154,325 as compared with the preceding year.

	1932.	1933.
	£	£
Electrical machinery	174,036	208,399
Electric wire and cable	99,528	62,699
Radio sets and parts	136,894	226,000
Electrical lighting accessories, fittings and parts...	52,997	43,638
Other electrical goods	163,748	245,465
Copper wire	10,274	5,601
Totals	£637,477	£791,802

While three of the items show an increase, the most striking feature of the table is the great advance which took place in the imports of radio sets and material.

Artistic Church Lighting

Two lighting installations in churches have been undertaken recently by the North Metropolitan Electric Power Supply Co. Considerable thought was given in both instances to ensure that the maximum illumination is obtained at the pews, while the walls are lighted adequately but to a lower value. Chipping Barnet parish church is illuminated by means of twenty-nine Benjamin "Intensolux" reflectors with 200-W lamps in the main body of the church, and with 150-W and 100-W lamps in the side aisles. Particular attention was paid to the chancel and altar lighting. In the former the "Intensolux" are supplemented by Benjamin "Parabolic Angle" reflectors to illuminate the east wall and decorated ceiling in this

Lighting in the Chipping Barnet parish church

part of the church. The altar is picked out with two reflectors and 100-W floodlight lamps. The Church of St. Paul, Apostle and Martyr, Southgate, N.11, is lighted by means of eight "Intensolux" reflectors with 200-W lamps in the nave, and "Elliptical Angle" reflectors with 100-W lamps in the side aisles. Two "Parabolic Angle" reflectors illuminate the chancel, and the crucifix and screen are lighted by a supplementary reflector.

The British Industries Fair

The handlamp of the British Central Electrical Co., Ltd., mentioned in our notes on the Fair last week, is called the "Gripper," not "Grippu," as printed.

A number of exhibitors sent particulars of their displays too late for our last issue. Among these is the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., which shows at Birmingham mechanical rubber, ebonite, gutta percha goods and primary batteries, as well as transmission belting. Samples of Silvertown escalator rail made of rubber and fabric can be seen on the stand.

Tube Products, Ltd., are showing electrically welded steel

tubing in sizes from ⅜ in. to 2¼ in. at Birmingham for transformers, tubular heaters, handrailing and display work.

Batteries, Ltd., show a range of "Nife" non-acid batteries fitted with steel plates. This type of battery is used for the emergency lighting at the Mayfair Cinema, Birmingham. The stand of the Ioco Rubber & Waterproofing Co., Ltd., is panelled with the company's "Artoco" specially treated plywood with a synthetic resin finish.

The Donovan Electrical Co., Ltd., exhibits the latest improvements in switch, fuse and control gear, automatic multi-speed starters for squirrel-cage induction motors, automatic slip-ring motor starters, automatic primary resistance starters, direct-on-the-line starters, h.p. isolating switches, isolating links, and the latest developments of combined switch sockets and plugs for use with portable or fixed motors, portable tools, &c., as well as a new fuse with non-springy contacts. A wide range of "Diamond" ladder work is being shown by Messrs. Drew, Clark & Co.

The Staines Kitchen Equipment Co., Ltd., is showing a new junior "Splendid" crockery-washing machine priced at £50, as well as the standard larger models, potato-peeling machines, and silver-burnishing machines, all electrically operated.

The Midland Fan Co., Ltd., is showing ventilating fans and various types of paint-spraying equipment.

The Electrical Association for Women

The Electrical Association for Women was registered on February 17th as a company limited by guaranteee without share capital, with an unlimited number of members, each liable for 10s. in the event of winding up. The word "Limited" is omitted from the title by licence of the Board of Trade. The objects are to make provision for the education of, and to give instruction and training to, women and others with regard to electrical energy, and in all other branches of domestic science, hygiene and social welfare. The management is vested in an executive committee, the first members of which are: Lady Moir, M.B.E., the Dowager Lady Swaythling, Mrs. G. Z. de Ferranti, Councillor Mrs. E. Gregory, Mrs. N. S. Atkinson, Mrs. A. A. A. Bentham, Mrs. I. E. Bray, Mr. F. S. Button, Mrs. M. P. Chalmers, Mrs. C. Christie, Miss H. Enfield, Mrs. M. B. Jackson, Miss F. E. Jones, Mrs. A. E. Rycroft, Miss G. F. Sharp, and Lady A. Snell. Secretary: Miss C. Haslett. Registered office is at 20, Regent Street, S.W.1.

Scottish Electrical Manufacturers and Factors

At the recent annual general meeting of the Scottish Electrical Manufacturers' and Factors' Association, Mr. Michael Black (Michael Black, Ltd.) was appointed chairman and Mr. James Sloan (Sloan Electrical Co., Ltd.) vice-chairman. The report submitted on the activities of the Association during the past year showed that the Inquiries Department had been well utilised, and the debt recovery record showed that the proportion of totally bad accounts to the gross amount for collection was 1.2 per cent.

A Distribution Cable Unit

Messrs. W. T. Henley's Telegraph Works Co., Ltd., inform us that there is a slight inaccuracy in the article under the above heading in our issue of February 9th. The correct details of the bus-bars are: The bus-bar for the lighting cores, switch wires, &c., comprises a twin set of $\frac{3}{16}$ in. by ⅛ in. thick tinned copper strips, whilst the bus-bars for the 150-A—1,000-A units comprise one, two, three, five or six twin sets of strips measuring ⅛ in. by $\frac{3}{32}$ in. thick.

Prices of Materials

Messrs. F. Smith & Co. report February 21st: Copper (electrolytic) bars, £35 10s., £1 5s. dec. Ditto, ditto wire rods, £41, £1 5s. dec. Ditto, ditto h.c. wire, 7d., ½d. dec. Silicium bronze wire, 8d., ½d. dec.

Messrs. Edward Till & Co. report, February 21st: No change in the price of india-rubber, Para fine.

Messrs. James & Shakespeare report, February 21st: Copper bars (best selected), sheet and rod, £62, £2 dec. Copper (electrolytic) sheets, £36 to £36 10s., 2s. 6d. inc. English pig lead, no change.

A Vacuum Cleaner Display

The accompanying illustration shows a "Mary Ann" vacuum cleaner window display which British Electric Domestic Appliances, Ltd., is distributing free to its dealers.

A "Mary Ann" vacuum cleaner display

The display can be adapted for one or two machines, and consists of black, red and gold crèpe paper with a printed pelmet stretching across the front of the window. The accessories shown are now supplied in place of those illustrated in our last issue.

For Sale

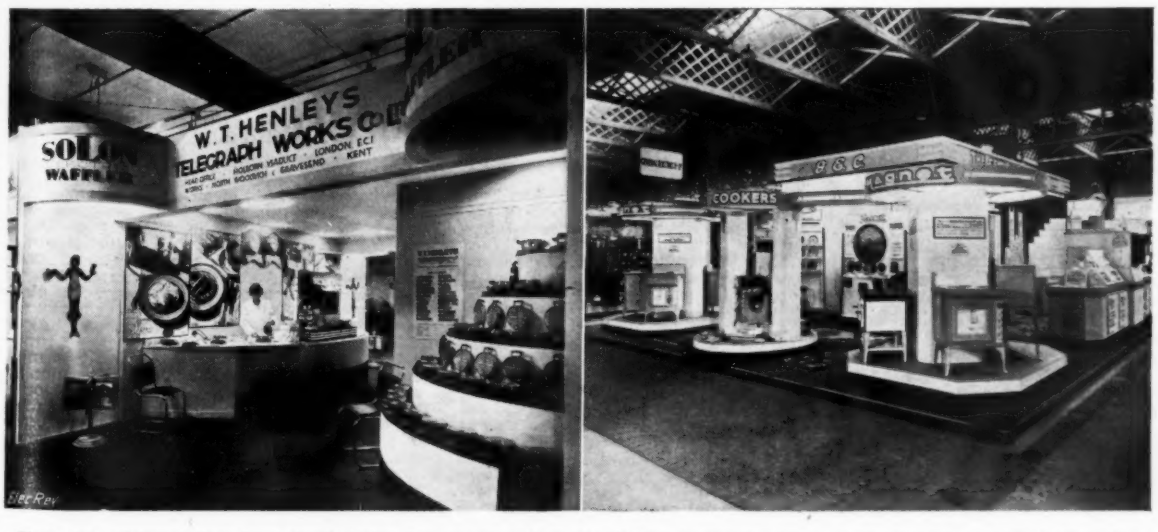
The Ashford U.D.C. has for disposal a 28-A 50-V direct-coupled engine and dynamo.

The Great Western Railway has for disposal two "Hewittic" mercury-arc rectifiers.

(See our classified advertisements.)

E.D.A. Luncheons

The annual general meeting and luncheon of the Northern Counties Area of the British Electrical Development Association will be held on March 16th at the Grand Assembly Rooms, Newcastle-on-Tyne. Tickets for the luncheon (4s. 6d. each) can be obtained from Mr. A. Parkin, E.D.A. Area Offices, 47, Pilgrim Street, Newcastle.



These two pictures show how stand design has progressed at the British Industries Fair:—Left: Henley's stand at Olympia. Right: The G.E.C. display at Castle Bromwich

The annual luncheon of the South-West Area of the Association will be held on March 13th at the Royal Hotel, Bristol, and will be followed by the annual meeting.

Specification for Steel Eyebolts

For some time past the British Standards Institution has been engaged in the preparation of a series of specifications for chain terminal fittings, the first of which (B.S.S. No. 482 Load Hooks) made its appearance early last year. The latest is B.S.S. No. 529-1934, which deals with steel eyebolts such as are extensively used in the electrical and other industries

This new specification has unusual interest in that the design is original and that it was the subject of careful investigation and exhaustive tests at the National Physical Laboratory. Copies of this specification (B.S.S. No. 529-1934) may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

Recent Contracts

Messrs. Cowans, Sheldon and Co., Ltd., have secured a contract from the L.N.E.R. Co. for the supply of a five-ton electric crane in connection with a new dock being built at Grimsby.

Messrs. C. A. Parsons & Co., Ltd., have received from Imperial Chemical Industries, Ltd., for Castner-Kellner Alkali Co., Ltd., Runcorn, an order for a 15,000-kW turbo-alternator and exciter, complete with surface condensing plant. The machine will be of the two-cylinder tandem type with a normal

Members of the Electricity Sports Club of the North-West Midlands J.E.A. at their annual swimming gala. The group includes Messrs. N. Wainright and R. H. Leivers, holders of many records, and participants in the Olympic Games at Los Angeles, 1932

running speed of 3,000 r.p.m., and will be designed for operating with steam at a pressure of 600 lb. per sq. in. gauge, at a temperature of 800 deg. F. The alternator will generate current at 10,500 V, 50 cycles.

The *Journal de Brazil* has ordered a 10-kW broadcasting equipment which will be manufactured in London by Standard Telephones and Cables, Ltd. An outstanding point of technical interest is that the speech input equipment for this broadcaster and the necessary microphones will all be operated directly from a.c. mains, thus completely eliminating the use of batteries. The company is already installing a further 10-kW broadcaster of the type ordered by Brazil for the Norwegian station at Finmarken.

Trade Announcements

Messrs. Robertson & Bryan have commenced business as electrical contractors at 52, Sandgate, Ayr.

Messrs. Hick, Hargreaves & Co., Ltd., have purchased the whole of the goodwill, patterns and drawings of Messrs. Scott & Hodgson, Ltd. (in liquidation), Guide Bridge Iron Works, Manchester, with the exception of their small steam turbine business. They have engaged the services of Mr. W. Burrows, for many years the chief engineer of Scott & Hodgson, Ltd., and it is their intention to carry on the company's heavy engine business, including rolling mill drives, flywheel sets, &c., together with all repairs and renewals of engines built by this firm.

Messrs. C. H. Blackburn & Co. now have their office and works in one building, and in future correspondence should be addressed to 2, Sandland Street, W.C.1.

Messrs. Alfred Herbert, Ltd., state that they are now distributors in this country of a range of "Rotax" portable electric tools.

New Catalogues and Lists

F. C. Heayberd & Co., 10, Finsbury Street, E.C.2.—A leaflet describing a new "universal" charger.

British Insulated Cables, Ltd., Prescot.—Catalogues of electrolytic condensers, radio materials, and 66- and 33-kV cables.

Radiant Heating Co., 75, Cecil Street, Birmingham, 19.—A leaflet describing the new "Wellington" fire.

Cochranes (Middlesboro') Foundry, Ltd., Ormesby Iron Works, Middlesbrough.—A stock list of cast-iron and spun iron pipes.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2.—A folder describing a new 10 guinea 5-valve battery set (834b) to be released on March 1st.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.—An illustrated brochure on "Mazda Mercra" gaseous discharge lamps for street and industrial lighting.

John Harper & Co., Ltd., Albion Works, Willenhall.—"Nickel Cast Iron with the Harper Skin" is the title of a recently issued brochure.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—Leaflets on "Nikron" current transformers (E.53/54 and E4 (A)), and an averaging recorder (D.51).

Switchgear & Equipment, Ltd., Banbury, Oxon.—A leaflet on low-voltage outdoor fuses.

Rotoplunge Pump Co., Ltd., 58, Victoria Street, London, S.W.1.—A leaflet describing an automatic variable stroke oil fuel pump.

The British Aluminium Co., Ltd., Adelaide House, E.C.4.—A 44-page booklet on aluminium sections. All types are illustrated.

M.K. Electric, Ltd., Wakefield Street, N.18.—Leaflets on a new three-pin, 5-A twin adaptor and a range of fused plugs.

Halford Radio, Ltd., 39, Sackville Street, Piccadilly, W.1.—Price list of Gambrell-Halford wireless receivers, radiogram converters and amplifying units.

Ioco Rubber & Waterproofing Co., Ltd., Netherton Works, Anniesland, Glasgow, W.3.—A leaflet describing "Artoco" panels.

Bankruptcy Proceedings

F. W. Chattaway and **J. A. London,** trading in co-partnership as "Spa Electric and Radio Co.," 1, Church Walk, Leamington Spa, Warwickshire, electrical and radio engineers.—The receiving order against these debtors was made on their own petition recently, and their statement of affairs shows joint ranking liabilities of £915, with net assets of £35, leaving a deficiency of £880. The separate estate of F. W. Chattaway discloses unsecured liabilities of £56 and no assets, whilst that of J. A. London shows liabilities of £25 and no assets. The failure is attributed to lack of capital, heavy overhead expenses, and losses on contracts. It appears that in September, 1930, debtors and another entered into partnership. Later the third partner withdrew, and his capital was repaid. The debtors then took over the assets and liabilities of the partnership and continued the business together. They state that losses have been sustained on contracts for house installations, and the general trade depression has also affected the business. They realised their position early in 1932.

W. H. Tweedle (trading as Premier Radio and Electrical Supplies), Paddock Head, Paddock, Huddersfield, radio engineer and dealer.—The public examination of this debtor was held at the County Court, Queen Street, Huddersfield, recently. The statement of affairs lodged showed liabilities of £372 and assets estimated at £24, leaving a deficiency of £348. The examination was closed.

F. H. Thomas and **W. E. Evans** (Thomas & Evans), electrical engineers, Salubrious Chambers, Salubrious Passage, Swansea.—Last day for receiving proofs for dividend March 3rd. Trustee, Mr. A. J. Rogers, Government Buildings, St. Mary's Street, Swansea, Official Receiver.

W. E. Evans (separate estate), electrical engineer, Salubrious Chambers, Salubrious Passage, Swansea.—First and final dividend of 20s. in the £, payable February 20th at Government Buildings, St. Mary's Street, Swansea.

S. Purcell, electrical contractor. The Arcade, Goole.—Last day for receiving proofs for dividend March 3rd. Trustee, Mr. B. S. Briggs, 13, Burton Street, Wakefield. Official Receiver.

F. J. Woolfenden and **J. D. Lister** (Frank Woolfenden & Lister), electrical and radio engineers, 56, Victoria Street, Littleborough.—First and final dividend of 5s. in the £, payable February 23rd at the Official Receiver's Offices, Byrom Street, Manchester.

D. Tweedle, radio and electrical engineer, 42, Market Street, Milnsbridge, Huddersfield.—Receiving order made February 9th on debtor's own petition.

H. J. Couzens, electrical contractor, 165, Young Street, Sheffield.—Receiving order made February 8th on debtor's own petition.

H. M. P. Bridge (Bellhouse Radio & Electrical Salon), 44, Bellhouse Road, Sheffield.—Last day for receiving proofs for dividend February 28th. Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield, Official Receiver.

V. Gray, wireless dealer, 4, Young Street, Doncaster.—Last day for receiving proofs for dividend February 28th. Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield. Official Receiver.

H. F. Griffiths, electrical engineer, 19, Mount Pleasant, Bilston.—Last day for receiving proofs for dividend February 28th. Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham, Official Receiver.

J. Stewart, radio dealer, 10, Murton Street, Murton Colliery.—First and final dividend of 1s. 4½d. in the £, payable February 16th at 32, Frederick Street, Sunderland.

Company Liquidations

Lambert Laws (Wholesale), Ltd., electrical and radio wholesalers, 16, Richmond Street, Brighton.—The creditors were called together on February 15th, at the offices of Mr. A. E. Orbell, accountant and auditor, 6 and 7, Old Steine, Brighton. The statement of affairs showed ranking liabilities of £2,284 and net assets of £1,451. Mr. A. E. Orbell reported that the cash creditor was the chairman of the company, his claim representing the balance of a loan of £1,000. The company was registered on January 26th, 1933, with a nominal capital of £500, of which £100 has been issued and fully paid. Immediately after the formation of the company the chairman made it a loan of £1,000, and the company purchased from him the stock, fittings, plant, &c., of a business that he had previously carried on. Between January 26th, 1933, and February 7th last the purchases were £3,569; the sales amounted to £2,400, and there was a gross profit of £67. There was a net loss, however, of £852. A resolution was passed confirming the voluntary liquidation of the company, with Mr. Orbell as liquidator, whilst a committee was also appointed.

Makin & Co., Ltd.—Meeting March 16th at 9 and 11, Figtree Lane, Sheffield, to receive an account of the winding-up by the liquidator, Mr. P. Toothill.

Electrical Contractors (Sileby), Ltd.—Winding up voluntarily. Liquidator, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham.—Particulars of claims to the liquidator by March 27th.

Associated Radio Distributing Co. (London), Ltd.—Winding up voluntarily. Liquidator, Mr. G. C. Jarvis, 115-117, Cannon Street, E.C.

Albion Electric Lamp Works, Ltd.—Particulars of claims by March 3rd to the liquidator, Mr. C. A. Smith, 26, Budge Row, E.C.

English Cable Supplies, Ltd.—Meetings March 16th at 9, Harrington Street, Liverpool, to receive an account of the winding up by the liquidators, Messrs. P. S. Booth and P. E. Wallis.

Electricity Supply

Lighting, Domestic, Power

Bedford.—SUPPLY SANCTIONED.—The Corporation Electricity Committee has agreed to a supply of electricity to Shortmead Street, Biggleswade, being provided by the undertaking of the Letchworth First Garden City, Ltd.

Birkenhead.—REDUCED CHARGES.—The Electricity Committee recommends the Town Council to approve of reductions in the charges for current. It is proposed to make a reduction of at least 5 per cent. on the present price of electricity to all classes of consumers, except where there is a special agreement in existence, and to allow one meter per house free of charge.

Bridge.—SUPPLY EXTENSIONS.—The South-East Kent Electric Power Co. has informed the Rural District Council of its intention to carry out a scheme for supplying electricity to Littlebourne, Fordwich, and Bridge, and probably to Bekesbourne and Patrixbourne. The Council has asked the company for information regarding the supplying of other parishes in its area.

Brighton.—MAINS EXTENSIONS.—The mains are to be extended at a cost of £2,278.

LADIES' MILE ESTATE.—Regarding the supply to Ladies' Mile Estate, it is proposed to spend £5,680 on mains and £3,725 on sub-station equipment. In connection with the Sports Stadium, £1,569 is to be spent on mains and £3,458 on sub-station equipment.

AN ELECTRICAL DISPLAY AT AN AGRICULTURAL SHOW.—Mr. W. N. C. Clinch, the borough electrical engineer and manager, has reported that at a meeting attended by engineers representing the Sussex electricity supply undertakings, it was suggested that an electrical exhibition should be held at the Sussex County Agricultural Show to be held at Preston Park in June next. The proposal was agreed to subject to the confirmation of the Corporations or boards of directors concerned, each undertaking guaranteeing agreed proportions of the cost. The Brighton Committee has approved the idea and authorises the expenditure of a sum not exceeding £200 for the purpose.

Burton-on-Trent.—SUPPLY EXTENSIONS.—The Town Council has approved a proposal of the Electricity Committee to extend mains to Rangemore, Dunstall, Wychnor, and Barton at an estimated cost of £14,500.

Cannock.—EXTENSIONS.—The Urban District Council has applied for a loan of £11,500 for electricity purposes. The mains are to be extended to afford a supply at Gailey, and £759 is to be expended on new plant to meet increased demands at Mid-Cannock Colliery. A scheme is also to be prepared for affording a better supply of electricity to Landywood.

Cardiff.—GAS FIRES REPLACED BY ELECTRIC.—At a recent Property Committee meeting the city manager reported that no points for electric fires were installed in the houses in Wilson and Courtis Roads and the tenants were complaining of the gas fires. The Committee decided to install electric fires in those houses where gas fires were found to be defective, and to grant permission to other tenants who applied for the installation of electric fires, provided they were prepared to pay the cost by an addition to their rent.

Clacton-on-Sea.—REDUCED TWO-PART TARIFF.—In view of the increased assessments, the Town Council has approved the Electricity Committee's recommendation to reduce the standing charge of 20 per cent. of the rateable value to 12½ per cent. as from April 1st.

Clydebank.—NEW CABLES.—The Strathclyde Electricity Supply Co., Ltd., is to lay electric cables in Graham Street and Kilbowie Road from Tullis sub-station to Second Avenue, and in Riddell Street to Clarence Street.

Darlington.—OVERHEAD LINES.—The Town Council is to extend its mains in Coniscliffe Road by the erection of overhead lines.

Dartford.—POWER STATION IMPROVEMENTS.—The borough electrical engineer has been authorised to obtain tenders for sixteen extra h.p. panels for the electricity works.

NEW CABLES.—The Corporation is to relay cables in Waterside at a cost of £336 and change over the system in the Burnham Road area at a cost of £454.

Dorchester.—CHANGE-OVER.—The Town Council has applied to the Electricity Commissioners for sanction to change over the system of supply.

Ealing.—ELECTRICAL PROPAGANDA.—The Electricity Committee has agreed upon a scheme for the display of fittings and apparatus at the showrooms of electrical firms in order to develop the use of electricity for all purposes, and is to make a charge of 1d. per kWh for electricity used in this connection.

Egypt.—ASSIUT ELECTRIFICATION PROJECT.—The Public Works Department of the Egyptian Government has worked out a scheme for a hydro-electric power station in connection with the project for strengthening the Assiut dam. The cost would be about £E500,000, and the execution of the electrification scheme would mean that within a radius of 100 miles from Assiut it should be possible to irrigate by means of electrically driven pumps instead of artesian wells as at present. There does not appear much likelihood, however, of the plan coming to fruition in the near future.

Luton.—OVERHEAD LINES.—The Town Council has received sanction to a loan of £2,986 for overhead lines, and consent to the use of such lines for supplying Studham and Chalgrave.

Gateshead-on-Tyne.—ELECTRICITY FOR COUNCIL HOUSES.—The Town Council has agreed to have electricity installed in eighty houses to be erected on the Saltmeadows Estate.

Glasgow.—STREET LIGHTING.—The Lighting Committee is considering a scheme for the improvement of street lighting at a cost of £6,500.

Great Yarmouth.—LOAN SANCTIONED.—The Town Council has received sanction to borrow £40,000 for mains and services, and a loan of £5,300 for laying eight additional submarine cables from the electricity works across the river to Ferry Hill has been applied for.

Hastings.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to a loan of £10,000 for sub-stations and equipment.

Horncastle.—COUNCIL PROTEST.—The Urban District Council insists that cables which the Mid-Lincolnshire Electricity Co. proposes to erect overhead be placed underground. The company is to appeal to the Ministry of Transport.

Isle of Man.—PROGRESS. Progress is being made towards the completion of the Isle of Man electricity undertaking, and recently a change-over in supply has taken place in the districts of Port Lewaigue, near Ramsey, and Baldrine. These places were formerly supplied by the Laxey Electric Light and Power Co., whose undertaking has been taken over by the Isle of Man Electricity Board. Authority has been granted to the Board to borrow a further £20,000, in additional to the £80,000 already borrowed, for the completion of the system.

Isle of Thanet.—OVERHEAD LINES.—The Rural District Council has consented to the erection of overhead lines at Minster by the South-Eastern Electric Co., which has completed the line from Betteshanger.

British Electrical Exports during January

Destination.	Exports of electrical goods and apparatus in Jan., 1934.	Inc. or dec. as compared with Jan., 1933.	Exports of elec. generators in Jan., 1934.	Inc. or dec. as compared with Jan., 1933.	Exports of elec. motors in Jan., 1934.	Inc. or dec. as compared with Jan., 1933.	Exports of other elec. machinery in Jan., 1934.	Inc. or dec. as compared with Jan., 1933.
Irish Free State	£28,284	– £10,628	*		*		*	
Union of South Africa	103,539	– 26,483	£2,259	+ £1,594	£11,802	+ £5,434	£44,270	+ £21,804
British India	81,116	– 563	3,301	– 376	5,961	+ 797	29,880	+ 8,187
British Malaya	12,120	+ 3,488	*		*		1,039	– 442
Ceylon	3,923	+ 1,847	*		*		*	
Hong Kong	9,240	– 2,315	*		*		*	
Australia	57,307	+ 15,278	600	– 568	3,602	– 2,047	4,689	+ 2,026
New Zealand	25,898	+ 980	*		1,444	– 1,001	2,872	+ 161
Canada	6,197	+ 489	2,253	+ 1,960	1,642	– 347	1,541	– 329
Other British countries	64,943	+ 33,114	4,898	+ 2,348	8,276	+ 6,215	9,154	+ 2,549
Sweden	5,037	– 2,557	*		*		*	
Denmark	7,500	– 3,208	*		*		*	
Belgium	12,749	– 6,111	*		*		1,726	– 2,261
France	14,836	– 7,680	*		*		*	
Spain	4,172	– 875	*		*		*	
Italy	10,657	– 6,206	*		*		*	
Greece	3,325	+ 1,535	*		*		1,547	+ 1,156
Egypt	18,741	+ 11,333	*		*		5,195	+ 3,097
China	18,427	+ 8,339	*		*		*	
United States	4,191	+ 2,947	*		783	– 576	671	– 774
Argentina	19,901	+ 6,908	—	– 2,725	35	– 9,976	3	– 2,550
Russia	*		100	– 177	*		1,236	+ 298
Netherlands								
Other foreign countries	125,827	– 27,169	70,520	+ 62,986	37,634	+ 31,299	21,176	+ 849
Total	£637,930	+ £66,685	£83,931	+ £65,042	£71,179	+ £29,798	£124,999	+ £33,771

* Not classified separately.

Liverpool.—RATE RELIEF.—The Electric Power and Lighting Committee has recommended that a contribution of £70,000 out of the profit for the year ending March 31st be made to rate relief. The Tramways and Motor Bus Committee has recommended an allocation of £25,000 to the rates.

London.—FULHAM.—The Electricity Committee has under consideration a number of new domestic apparatus schemes. They include one for the development of the hire of domestic apparatus in conjunction with prepayment meters; one for the development of the "all-in" domestic apparatus and lighting scheme with quarterly meters, and one for the development of the heating load by means of a special water-heating rate to landlords. The rate for cooking and water heating, including hire and maintenance of apparatus, will be 1¾d. per kWh with a rebate of ¼d. per kWh on all energy consumed since the previous collection, provided the average weekly consumption is in excess of a fixed minimum. The special water-heating rate is 1¼d. per kWh for 630 kWh or less per quarter, over that amount a 1d. per kWh to be charged. These charges cover hire of apparatus. Under all schemes, consumers who adopt electric cooking will be required to give an undertaking to remove gas cookers.

ST. MARYLEBONE.—The Electricity Committee is seeking sanction to borrow £138,983 for additional cables and switchgear and the provision of transformer stations. Sanction is also to be sought to change over the supply from d.c. to a.c. as and when circumstances permit.

Manchester.—SUPPLY EXTENSION.—The Electricity Committee is applying for an Order enabling it to provide a supply to the Parishes of Carrington and Partington.

Millport (Ayrshire).—NEGOTIATIONS FOR A SUPPLY.—Representatives of the Town Council and the Ayrshire Electricity Board are negotiating to obtain an electricity supply for the burgh by means of a submarine cable from the mainland.

Northallerton.—LOWER CHARGES.—Following a letter from the Urban District Council asking for electricity prices to be reduced, a general reduction of 1d. per kWh has been made by the North-Eastern Electric Supply Co., Ltd. in electricity charges for the Northallerton area, including the villages of Northallerton, Romanby, Brompton, Thirsk, Bedale, Thornton-le-Moor, Scruton, Aiderby, Steeple and Leeming.

Norwich.—EXTENSION.—The Electricity Committee is seeking sanction to borrow £15,388 for the construction of a 33,000-V line from Thorpe power station to Sall.

Oswestry.—PORTHYWAEN.—The Town Council has declined to give a supply of electricity to Porthywaen as the guarantees to meet the cost of the extension (£493) are not forthcoming.

Paisley.—ALL-ELECTRIC HOUSES.—The Town Council has decided that fifty dwellings in the new housing scheme at Gallowhill shall be all-electric. There will be no extra charge to the tenants.

Portsmouth.—SUB-STATION.—The Electricity Committee has purchased a site at Waterlooville for the erection of a sub-station.

PLANT FOR HOSPITAL.—The Health Committee is to provide X-ray plant and buildings at St. Mary's Hospital at an estimated cost of £2,500. The hospital is also to be rewired at a cost of £591.

The lighting is one of the attractive features of this new brasserie opened by Messrs. J. Lyons & Co. in Oxford Street, W., last week

Reading.—ASSISTED WIRING.—The Town Council is to adopt an assisted-wiring scheme by which the work will be carried out by the Electricity Department.

St. Austell.—REDUCED CHARGES.—The Rural District Council has been notified that the St. Austell Electricity Co. is prepared to reduce the charge for lighting from 10d. to 9d. per kWh at once and to 8d. in two years' time provided the Council assents to an extension of the company's Order, which expires in ten years' time. It was pointed out that the Electricity Commissioners could override the company's refusal to reduce the price unconditionally, and the Council decided to take no action pending a reply from the Commissioners.

Sleaford.—REPORT APPROVED.—The Urban District Council has approved the final report of the consulting engineer, Mr. Gamblen, which provides for an expenditure of £12,114 in respect of the electricity scheme.

Southwold.—CHANGE-OVER.—The East Anglian Electric Supply Co., Ltd., is to change-over the system of supply, and the company has offered to change consumers' lamps on payment of 25 per cent. of the cost.

Stafford.—LOAN.—The Town Council has applied for a loan of £3,303 for e.h.p. mains to the works of Lotus, Ltd., and the Universal Grinding Wheel Co.

Stockton-on-Tees.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £10,000 for mains and services.

SUB-STATION.—The Town Council is to erect a sub-station at Norton to cost £800.

Swansea.—EXTENSION OF SUPPLY AREA.—The Electricity Committee has agreed to afford a supply of electricity to Messrs. Baldwins at their Landore, Mannesmann, and King's Dock works, and to seek sanction to borrow £20,350, the estimated cost.

Tredegar.—LOAN SANCTIONED.—The Council has received sanction to borrow £6,500 for an electricity scheme.

Watford.—HIRE PURCHASE.—The Electricity Committee recommends that a period of five years be adopted in the future for the hire-purchase of wiring installations. There is also a further recommendation that the spread-over period for hire purchase of heating points be altered from three to two years.

Westlinton.—SUPPLY TO BLACKFORD.—The Parish Council has decided to approach the Carlisle City Council with regard to a supply of electricity for the village of Blackford.

Whitby.—CHANGE-OVER.—The Urban District Council has instructed the electrical engineer to obtain the necessary cables, transformers, switchgear, &c., for the pending change-over.

Wolverhampton.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £650, and provide a sub-station on an estate at Trysull Road at a cost of £2,740.

ELECTRICITY SUPPLY.—The Electricity Committee has consented to a proposal of Cannock Urban District Council to apply for a Fringe Order to supply electricity to premises in the parish of Brewood.

Wrotham.—SUPPLY TO PLAXTOL.—The Urban District Council has decided to approach the Electricity Commissioners with a view to obtaining consent to electricity being supplied to the Plaxtol district by the Tonbridge Urban District Council.

Traction

Glasgow.—SUBWAY ELECTRIFICATION.—A feature of the conversion of the Subway from cable to electric traction will be an installation of automatic train-control apparatus, the first to be put into operation in Scotland. The plant will be similar to that in use on the London Underground railways, which has contributed in no small degree to their immunity from accident. The Subway is to be fully signalled, and working in conjunction with each signal will be an electric train stop.

Southern Railway.—ANNUAL REPORT.—The annual report of the Southern Railway Co. shows that the total number of engine miles run during 1933 was 77,192,125, as compared with 74,277,161 during the preceding year. Of this total electrical motor vehicles showed an increase from 21,318,651 to 25,647,592 miles, while steam locomotives showed a decrease from 52,958,510 to 51,519,141 miles. The report states that in view of the development for residential purposes which is taking place in the Sevenoaks district, it has been decided to extend the electrification of the railway from Bickley and Orpington to Sevenoaks *via* Swanley Junction and Knockholt respectively (23 route miles), and to extend the electrification from Wivelsfield and Brighton to Lewes, Newhaven, Seaford, Eastbourne, Hastings and Ore (62 route miles).

Sweden.—RAILWAY ELECTRIFICATION.—*Reuter's Trade Service* says from Stockholm that in the Budget estimates for the financial year 1934-35, which are being dealt with by the present session of the Riksdag, it is proposed that an allowance of Kr.15,000,000 should be made for the electrification of further State Railway lines, in addition to the electrification work for which the estimates contain definite plans, *i.e.*, the continued electrification of the lines Malmö-Gothenburg and Stockholm-Krylbo-Aange with some junction lines.

Traffic Signals.—The Warwickshire County Council has decided to have vehicle-actuated traffic signals installed at

Stratford-on-Avon, Solihull, Wilnecote, and Henley-in-Arden, and the Salisbury City Council is to install automatic traffic signals in Winchester Street.

The Newport (I.O.W.) Highways Committee recommends the provision of vehicle-operated traffic signals costing £1,000.

Turkey.—ISTAMBOUL.—It is reported that an underground railway connecting the north and south of Istamboul is under consideration.

Underground Railway.—NEW KNIGHTSBRIDGE STATION.—The eastern section of the new Knightsbridge station was opened last Sunday. It has two complete "stations," with separate subways, booking halls, and sets of escalators, each "station" serving opposite ends of the same platform below, although the two street entrances are a furlong apart. Knightsbridge West, the entrance to which is in Hans Crescent, will be opened in July.

Communications

Australia.—NEW EXCHANGE FOR MELBOURNE RAILWAYS.—A new telephone exchange is to be installed at the Railways Administration offices at Spencer Street station, Melbourne, and is to be completed by the end of the year. The work involves the laying of about four miles of cable in ducts and troughs throughout the buildings, and over 300 miles of copper conducting wire will be used.

Cardiff.—PARLIAMENTARY BILL.—The Parliamentary Committee has agreed to withdraw from the Parliamentary Bill the clause relating to radio rediffusion.

China.—LONG-DISTANCE TELEPHONY.—The Nanking Minister of Communications is reported to be discussing with the Kwangtung Provincial Government authorities a project for a long-distance telephone service to connect Nanking, Shanghai, Canton and Hankow, the principal cities of South and Central China.

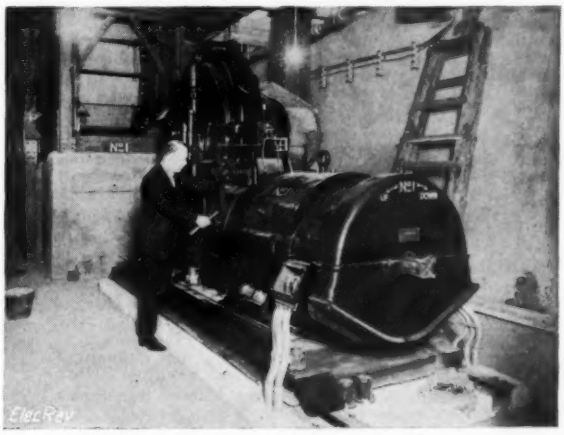
Great Britain.—RADIO RELAY SERVICES.—Ayr Town Council has granted permission to Ayrshire Wireless Services, Ltd., to install a wireless exchange in Ayr.

Driffield Urban District Council has sanctioned the operation of a relay service by Mr. L. S. Kemp, of Hornsea.

THE AUTODIAL.—The Post Office is shortly to introduce a new telephone apparatus which will enable subscribers on automatic exchanges to call other subscribers by merely depressing a lever. The apparatus, which will be known as the autodial, consists of a small box with an index and movable pointer. When a call is to be made the pointer is moved to the appropriate number and the lever depressed. Two sizes are available, for 25 or 50 numbers, at rentals of 6s. or 8s. a quarter respectively.

NEWCASTLE DISTRICT TELEPHONE REPORT.—The local P.T. & T. Advisory's Committee's report shows that in this area (superintending engineer: Mr. F. G. C. Baldwin) during 1933 about 5,300 new telephones were connected, making a net increase of 1,117, or 2.64 per cent. Twenty-eight additional street kiosks were erected, and eventually all kiosks will have the hand microphone type of instrument. Multi-coin boxes are also being installed, and a new manual exchange was opened at West Woodburn. Normally over 85 per cent. of the long-distance calls are completed "on demand." The number of local and junction calls originating in the area totalled 29,775,000 and the trunk calls 3,573,000. The number of written complaints received in connection with local and junction calls was 0.0018 per cent. Complete modernisation of the telegraph and photogram rooms at the main post office was effected during the year, and a service of letter telegrams was introduced.

India.—TELEPHONE EXTENSIONS APPROVED.—The Standing Finance Committee of the Indian Assembly has approved important extensions to the telephone trunk services. Amongst the new works to be carried out are trunk lines between Kohat and Bannu; from Agra to Gwalior; from Sukkur to Multan; from Keul (Monghyr District) to Bhagalpur; from Bombay to Bhusawal by pairing the existing wires; a trunk circuit



One of the 100-h.p. Laurence Scott motors driving the escalators at the reconstructed Knightsbridge Underground station

from Ahmedabad to Hyderabad (Sind) *via* Ajmer; an automatic telephone exchange for Karnal and its connection with the trunk line to Ambala; the installation of an extension switchboard at Amritsar telephone exchange; the installation of a three-channel carrier telephone system between Bombay and Poona, with a one-channel carrier system between Poona and Madras.

A wireless telegraph and telephone short-wave circuit is to be established between Madras and Rangoon, which will give telephone trunk communication between Burma and India, and also through Bombay and London with the rest of the world. It will also provide telegraph communication between India and Burma without the necessity of the projected land line *via* Arakan, the most expensive portions of which will be abandoned. Telephone exchanges are also to be opened at Tinsukia (Lakhimpur District, East Bengal); and non-departmental exchanges at Hoogriyan and Khankikhoa, to serve the Assam tea garden area. The total cost of the proposed expenditure by the Post and Telegraph Department is about £400,000. Tenders will be invited shortly for these schemes.

BROADCASTING PROPOSALS.—Included in the proposals of the Post and Telegraph Department approved by the Standing Finance Committee are the construction of wireless stations at Ormara (Las Bela State, Baluchistan) and Pasni (Kalat State, Baluchistan). On a commercial basis, broadcasting in India yielded a profit of more than £5,000 in 1932-33, and for the current year a profit of about £8,000 is expected. It is proposed to assist any local government which is prepared to adopt broadcasting either by supplying technical services or by contributing a share of the licence fees derived from the area.

New Non-ferrous Alloys

THE production of an alloy of peculiar interest is a metallurgical event as rare as it is important. To this class belong the new non-ferrous metals, briefly alluded to last week as being in a sense almost a curiosity, which have been developed by Imperial Chemical Industries, Ltd.

The remarkable feature is the very material improvement of the mechanical properties of these metals that results from their subjection to treatment which is contrary to all established practice. The discovery concerns a whole series of metals, including brass, copper, bronze, and nickel silver, to which the generic name "Kunial" has been given.

Whereas all commonly used copper alloys are annealed and softened by raising them to temperatures of from 400 deg. to 600 deg. C., similar heat-treatment may treble the hardness and double the tensile strength of the "Kunial" alloys. Yet, in spite of this, they can be extruded, rolled, drawn, and cold worked exactly in the same way as ordinary brass, for the production of rod, wire, tubes, strip and sheet.

"Kunial" brass, one of the most important of the series, is an alloy of copper and zinc, together with other elements which impart to the metal its new properties. The copper and zinc contents may be varied within wide limits, thus modifying to some extent the basic properties of the alloy, but in all cases it can be hardened and strengthened by suitable heat-treatment. By heating the soft quenched alloy brass strip to 500 deg. C. the diamond pyramid hardness is increased by about 100, the limit of proportionality and proof stress are multiplied fourfold, the tensile strength is increased by fourteen tons per sq. in., while the elongation is only halved. If the cold-worked alloy is heated to 450 deg. C. the diamond pyramid hardness will be increased by about 40, and the limit of proportionality and tensile strength considerably increased, but, still more strange, the increase in strength will be accompanied by an increase in elongation. These properties are similar to those met with in such alloys as duralumin and beryllium copper.

"Kunial" brass is an ordinary commercial alloy, and, although the raw materials entering into its composition are more expensive than those in ordinary brass, for products of equal strength, it may be possible to make the finished article more cheaply of "Kunial" than of ordinary brass.

Articles can be stamped or machined from soft or work-hardened "Kunial" brass, and subsequently hardened and strengthened by simply heating to a suitable temperature, and it also permits of very hard and strong products being made in the form of hot stampings or castings.

There is no difficulty in changing the colour of the alloys, all of which possess a high resistance to corrosion by sea water. They are exhibited on the stand of I.C.I., Metals, Ltd., at the Birmingham Section of the British Industries Fair.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Abertillery.—March 7th. Electricity Department. Overhead transmission lines. (February 16th.)

Argentina.—BUENOS AIRES.—March 12th. Electrical equipment for operating three sluice valves. (A.Y. 12217.)*

Australia.—MELBOURNE.—Post and Telegraph Department. March 27th. 150-600 miles of twin 0.048-in. rubber-insulated, braided telephone wire. (A.Y. 12194.)*

City Council. March 12th. Totally enclosed metal-clad switchgear. (A.Y. 12170.)*

March 26th. Supply of three-phase, 6,600-V, metal-clad switchgear, suitable for rupturing 250,000 kVA. (A.Y. 12185.)*

PERTH.—April 19th. Western Australian Government Electricity Supply. Boiler house equipment, one 25,000-kW turbo-alternator and e.h.p. and l.p. switchgear. (February 2nd.)

Bexley.—February 27th. U.D.C. Transformers, two on-load tap-changing equipments and switchgear kiosks. (February 9th.)

Bristol.—March 16th. Baths Committee. Electrical heating plant, &c., at Shirehampton Baths. (See this issue.)

Cholsey (BERKS).—March 10th. Berks Mental Hospital Committee. Electric lighting and accessory works, &c., at the new villa' for females. (February 16th.)

Cleethorpes.—March 6th. Urban District Council. Transformers, switchgear and mains stores. (February 9th.)

Dover.—March 5th. Corporation. Meters, transformers, and cable for twelve months ending March 31st, 1935. (February 16th.)

Eccles.—February 26th. Cable joint boxes. Particulars from borough electrical engineer, Electricity Offices, King Street.

Edinburgh.—March 8th. Electricity Department. Materials for year ending May 28th, 1935. (February 16th.)

Egypt.—CAIRO.—March 17th. Ministry of Public Works. One d.c. 110-V 3-kW generating set (A.Y. 12232).*

Erith.—March 7th. Electricity Department. Electrical materials for the year ending March 31st, 1935. (February 16th.)

Fife.—March 1st. County Council. Various works, including electric lighting, at thirty-six houses at Crossgates and Fordell. Schedules from C. R. Douglas & Son, surveyors, Prudential Buildings, Dunfermline (deposit £1 1s.); offers to J. M. Mitchell, County Clerk, County Buildings, Cupar.

Hastings.—February 27th. Electricity Department. Switchgear, cable tiles, concrete covers, copper wire, &c., for twelve months ending March 31st, 1935. (February 2nd.)

Hull.—March 27th. Telephone Committee. Automatic telephone exchange. (February 9th.)

India.—TRAVANCORE.—May 7th. Government Electricity Department. Turbines, generators, switchgear, transformers, &c., for the Pallivasol hydro-electric scheme. (February 9th.)

NEW DELHI.—March 5th. Stores Department. Lead-sheathed v.i.r. cables. (A.Y. 12210.)*

Inverness.—March 7th. County Council. Various works, including electrical and heating, at new advanced division school. Schedules from Reid & Forbes, architects, 17, Great Stuart Street, Edinburgh; tenders to J. W. McKillop, county clerk, The Castle.

Kettering.—February 26th. Electricity Department. E.h.p. and l.p. underground cables for the year ending March 31st, 1935. (February 9th.)

London.—HAMMERSMITH.—February 28th. General electrical stores, &c., for twelve months. (January 19th.)

BATTERSEA.—March 8th. Electricity Department. Materials for one year from April 1st, 1934. (See this issue.)

Manchester.—February 28th. Cooling towers for Stuart Street power station. (February 9th.)

Milford.—February 28th. Electricity Department. Materials for twelve months ending March 31st, 1935. (February 9th.)

New Zealand.—WELLINGTON.—Posts and Telegraph Department. April 18th. 1,000 switchboard plugs and 2,500 24-V switchboard lamps. (A.Y. 12218.)*

March 27th. Public Works Tenders Board. One set each of 110-kV and 33-kV outdoor switching equipment and steelwork for these. (A.Y. 12180.)*

Public Works Department. April 24th. Four mimic bus panels to control four 110-kV oil circuit-breakers. (A.Y. 12176.)*

Northern Ireland.—BELFAST.—March 5th. Electricity Board. 33-kV and 11-kV overhead transmission lines, new l.p. distribution systems, and reconstruction of existing l.p. systems. (January 26th.)

Rhondda.—March 24th. Electricity Department. Meters, copper wire, joint boxes, &c., for year ending March 31st, 1935. (See this issue.)

South Africa.—JOHANNESBURG.—Railways and Harbours. March 26th. Six electric capstans for Port Elizabeth harbour. (A.Y. 12221.)*

Stoke-on-Trent.—March 7th. Electrical Engineer's Department. Meters, mains and cables for one year. (February 16th.)

March 12th. N.W. Midlands J.E.A. Transformers, e.h.p. and l.p. overhead transmission lines. (February 9th.)

Swansea.—March 19th. Electricity Department. One 20,000-kVA, 33,000/6,600-V transformer and sundry smaller transformers. (See this issue.)

Uruguay.—MONTEVIDEO.—March 21st. State Electricity Supply and Telephone Administration. H.p. and l.p. and telephone armoured cables. (A.Y. 12189.)*

April 2nd. 10,000 delta porcelain insulators for overhead transmission lines. (A.Y. 12227.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bathgate.—Town Council. Accepted. Mechanical stokers (£233).—J. Hodgkinson (Salford), Ltd.

Blackpool.—Transport Committee. Accepted. Fourteen double-deck tramcars with covered tops; twelve double-deck tramcars with open tops, and eleven toast-rack tramcars.—English Electric Co., Ltd.

Bootle.—Health Committee. Recommended. X-ray apparatus at health centre (£725).—Newton & Wright, Ltd.

Boston.—Town Council. Accepted. Sewage pumping plant (£3,281).—Mirrlees, Watson & Co., Ltd.

Burton-on-Trent.—Town Council. Accepted. Extensions to the outside area: Cables.—Johnson & Phillips, Ltd. Switches.—Metropolitan-Vickers Electrical Co., Ltd.

Cheshire.—County Highways Committee. Accepted. Traffic signals: Nantwich (£351); Mottram (£433); Northwich (£537).—Automatic Electric Co., Ltd.

Ipswich.—Electric Supply & Transport Committee. Recommended. Six double-deck trolley-buses (£10,365).—Ransomes, Sims & Jeffries.

Glasgow.—Housing Committee. Accepted. Electrical installation at housing schemes (£182).—Darroch & Espie.

Education Committee. Accepted. Electric clocks and fire alarms for schools.—J. Edward; K. Stark & Co.; Johnston Paris & Co.; W. Anderson, Ltd.

Police Committee. Accepted. Two electric lifts at Central Police Office (£898).—Waygood-Otis, Ltd.

Government Contracts.—The following contracts were placed by the various Government departments during January:—

ADMIRALTY (CONTRACTS AND PURCHASE DEPARTMENT).

Batteries and cells.—Chloride Electrical Storage Co.

Bells, gongs, &c.—Bonnella Bros.; Engg. & Lighting Equipment Co.; A. Graham & Co.; W. McGeoch & Co.

Electric cable.—G.E.C.; Connollys; Hackbridge Cable Co.; Standard Telephones & Cables; Anchor Cable Co.; B.I. Cables; Derby Cables; Ediswan Cables; Enfield Cable Works; Greengate & Irwell Rubber Co.; W. T. Glover & Co.; Henley's; Hooper's Teleg. & I.R. Works; I.R.G.P. & Teleg. Works; Johnson & Phillips; Liverpool Elect. Cable Co.; Macintosh Cable Co.; Mersey Cable Works; St. Helens Cable & Rubber Co.; Siemens Electric Lamps & Supplies; Ward & Goldstone.

Cells.—Ediswan; D.P. Battery Co.

Inert cells.—Siemens; Fuller Accumulator Co.; G.E.C.

Electric travelling crane.—Marshall, Fleming & Co.; Cowans, Sheldon & Co.

Electric light fittings.—Engg. & Lighting Equipment Co.; Fairless Engg. Supplies; Gabriel & Co.; G.E.C.; Ingram & Kemp; W. McGeoch & Co.; Player, Mitchell & Breeden; Rainsford & Lynes; Revo Electric; Small Electric Motors.

Electric light installation.—G. E. Taylor & Co.

Fuses.—Engg. & Lighting Equipment Co.

Heating elements.—Simplex Electric.

Lampholders.—Ediswan; G.E.C.; S. Heath & Sons; W. McGeoch & Co.; Player, Mitchell & Breeden; Rainsford & Lynes.

Electric incandescent lamps.—G.E.C.; Siemens Electric Lamps & Supplies; B.T.-H. Co.; Ediswan.

Lamps and lanterns.—Bulpitt & Sons; Player, Mitchell & Breeden; E. Griffiths & Sons.

Mica.—Attwater & Sons; Dacier; Micanite & Insulators.

Plugs and sockets.—Engg. & Lighting Equipment Co.

Signalling projectors.—Engg. & Lighting Equipment Co.

X-ray ward units.—A. E. Dean & Co.

WAR OFFICE.

Alternator plant.—Met.-Vick. Electl. Co.

Electric cable.—Siemens Bros.

Petrol electric crane.—Ransome & Rapier.

AIR MINISTRY.

Alkaline accumulators.—Batteries, Ltd.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; B.I. Cables; G.E.C.; Hall Telephone Accessories; Phœnix Telephone & Elect. Works; Plessey Co.; Siemens Bros.; Standard Telephones; Westinghouse Brake & Saxby Signal Co.

Wireless apparatus.—R.I., Ltd.

Cable.—Connollys; G.E.C.; Macintosh Cable Co.; Siemens Bros.; United Telephone Cables.

Loading coils.—Automatic Electric Co.; G.E.C.; Siemens Bros.; Standard Telephones.

Conduit.—Falk, Stadelmann; Longmore Bros.

Telephone cords.—Siemens Bros.

Desks.—Ericsson Telephones.

Rectifier elements.—Westinghouse Brake & Saxby Signal Co.

Electric light fittings.—Venner Time Switches.

Kiosks and parts.—Carron Company; Lion Foundry Co.

Transformers.—G.E.C.

Electric passenger lift.—Belfast central telephone exchange: W. Wadsworth & Sons.

Telephone exchange equipment.—Byron (London); Oxford: Hagley (Birmingham); London trunk (inland incoming positions and information desk positions): Standard Telephones. Ashton-in-Makerfield (Wigan); Lytham (Lancs); Chancery London); Aberystwyth; Whitefield (Manchester); Saltash (Plymouth); Plymstock (Plymouth): Automatic Electric Co. Taunton; Dorking: Ericsson Telephones. Sub-contractors: Chloride Electrical Storage Co. for batteries; Crompton, Parkinson for motor generators. Central (London): Ericsson Telephones. Sub-contractors: D.P. Battery Co. for batteries; Electric Construction Co. for motor generators and ringing machines. Leytonstone (London); Birmingham (Midland); Forest Hill (London); Hurstway (London): G.E.C. Prudential Assurance Co. (Private exchange); Mitcham (London): Siemens Bros.

Telephonic repeater equipment.—Southampton; Portsmouth; Marlborough; Taplow: G.E.C. Newcastle-on-Tyne: Standard Telephones.
Voice frequency telegraph equipment.—Aberdeen: Standard Telephones.

CROWN AGENTS FOR THE COLONIES.

Ceiling fans, &c.—G.E.C.
Radio telegraph telephone equipment.—Gambrell Bros.
Telephones, &c.—G.E.C.
Telephone cables.—Standard Telephones.
Telephone material.—Siemens Bros.

Kidderminster.—Town Council. Accepted. Wiring twenty houses for electric lighting (£59).—B. French.

London.—St. PANCRAS.—Contracts and Stores Committee. Recommended. Cable (£904).—Standard Telephones & Cables, Ltd. Vehicle-actuated traffic signals at Gray's Inn Road and Guildford Street (£429 and £35 per year maintenance) and at Phœnix Street, Pancras Road and Midland Road (£873 and £78 per year maintenance).—Siemens & General Electric Railway Signal Co., Ltd.
ISLINGTON.—Highways Committee. Recommended. Automatic traffic signals (£1,366).—Automatic Electric Co., Ltd.
St. MARYLEBONE.—Electricity Committee. Recommended. Switchgear for twelve months.—Ferguson, Pailin, Ltd.

Manchester.—Electricity Committee. Accepted. Cookers for twelve months.—Carron Company; Simplex Electric Co., Ltd.; British National Electrics, Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Two electric mobile cranes for use on Newcastle Quayside (£1,045).—Herbert Morris, Ltd.

Swansea.—Civic Centre Committee. Accepted. Standards and lamps for civic centre (£831).—Hill & Smith.
Electricity Committee. Accepted. Air compressors for new power station (£4,932).—J. Browett Lindley, Ltd. Sulphur and dust extraction plant, &c. (£49,903).—J. Howden & Co., Ltd.

Weymouth.—Town Council. Accepted. 500-kVA transformer for Upway sub-station (£215).—Ferranti, Ltd. L.p. cable (£825); switchgear for Ferrybridge sub-station (£230).—Johnson & Phillips, Ltd. Three 6-way c.i. unit pillars (£32 each) and one 5-way c.i. unit pillar (£26).—W. Lucy & Co., Ltd.

Wolverhampton.—Electricity Committee. Accepted. Feeder switch, &c., for Commercial Road sub-station (£830).—General Electric Co., Ltd.

Forthcoming Events

Birmingham Electric Club.—Friday, February 23rd. Grand Hotel, Birmingham. 7 p.m. "Modern Electric Resistance Furnaces." Mr. A. Glynne Lobley.

Institute of Marine Engineers.—Friday, February 23rd. Grosvenor House, W.1. 7 p.m. Annual dinner.

Institution of Electrical Engineers.—Monday, February 26th. Institution, London. 7 p.m. Informal meeting. Discussion on "The Design of Wiring Installations in Large Office Buildings." Opened by Mr. A. F. W. Richards. (*South Midland Students' Section*).—Saturday, February 24th. 4.30 p.m. Visit to the British Industries Fair, Birmingham. (*North-Eastern Centre*).—Monday, February 26th. Armstrong College, Newcastle-on-Tyne. 7 p.m. "The Influence of Certain Transmission-Lines Associated Apparatus on Travelling Waves." Mr. J. L. Miller. "The Design and Operation of a High-Speed Cathode-Ray Oscillograph." Messrs. J. L. Miller and J. E. L. Robinson. (*South Midland Centre*).—Monday, February 26th. Birmingham University, Birmingham. 7 p.m. "The Application of Automatic Voltage and Switch Control to Electrical Distribution Systems." Messrs. W. Kidd and J. L. Carr. (*North-Western Centre*).—Tuesday, February 27th. College of Technology, Manchester. 7.30 p.m. Faraday Lecture. "The Electrical Engineer and the Free Electron." Mr. C. C. Paterson. (*Scottish Centre*).—Tuesday, February 27th. 39, Elmbank Crescent, Glasgow. 7.30 p.m. "The Measurement of Noise, with Special Reference to Engineering Noise Problems." Messrs. B. A. G. Churcher, A. J. King, and H. Davies. (*Meter and Instrument Section*).—Friday, March 2nd. Institution, London. 7 p.m. "Copper-Oxide Rectifiers in Ammeters and Voltmeters." Mr. E. Hughes. "A Direct-Reading Form-Factor Meter." Mr. R. S. J. Spilsbury. (*London Students' Section*).—Saturday, March 3rd. 2.30 p.m. Visit to the United Glass Bottle Manufacturers (Charlton), Ltd., Charlton. (*North Midland Students Section*).—Saturday, March 3rd. Visit to Messrs. B. S. & W. Whiteley, Ltd., Pool-in-Wharfedale.

Diesel Engine Users' Association.—Tuesday, February 27th. Pagani's Restaurant, W.1. 7 for 7.30 p.m. Annual dinner.

Institution of Engineers-in-Charge.—Wednesday, February 28th. E.L.M.A., W.C.2. "Modern Methods of Electric Lighting." Mr. W. J. Jones.

Rugby Engineering Society.—Wednesday, February 28th. Benn Buildings, Rugby. 7.30 p.m. "Noise in Electrical Machinery." Messrs. J. H. Walker and F. Widnall.

Junior Institution of Engineers.—Friday, March 2nd. Institution, London. 7.30 p.m. "The Development of Brimsdown Power Station." Mr. H. A. Skinner.

Physical Society.—Friday, March 2nd. Imperial College of Science and Technology, London. 5 p.m. Five short papers will be read.

Royal Institution.—Friday, March 2nd. Institution, London. 9 p.m. "Current Research Problems in Engineering." Mr. H. J. Gough. Saturday, March 3rd. Institution, London. 3 p.m. "Transmutation of Matter." Lord Rutherford.

Association of Mining Electrical Engineers (*West Wales Branch*).—Saturday, March 3rd. Swansea. Annual dinner. (*Warwickshire and South Staffordshire Branch*).—Thursday, March 1st. County Mining College, Cannock. 6 p.m. "Signalling and Telephones in Mines." Mr. J. Cowan.

Electrical Power Engineers' Association (*London Technical Group*).—Saturday, March 3rd. Café Royal, W.1. 7 p.m. Annual dinner and dance.

Makers' Names Wanted

FARADAY bell pushes.
HOT SPOT bowl fire.

Notes

The Association of Supervising Electrical Engineers

The annual dinner of this Association was held on February 17th at the Trocadero, London, W. The president, Mr. J. M. Kennedy, was in the chair, and those present numbered 270. The toast of "The Electrical Industry" was proposed by Mr. P. V. Hunter (pres. I.E.E.), who, as chairman of the National Register of Electrical Installation Contractors, congratulated the members on the excellence of their work, which had come through the ordeal of nine months' examination by the Register's inspector with flying colours. Sir William Ray, M.P. (executive chairman, E.D.A.), responding, said he was proud to be associated with one of the most successful industries in the country, and he regarded it not only as his job but his delight to make people electrically conscious.

The health of the guests was proposed by the president, who referred to the presence of Colonel Crompton, Messrs. W. W. Lackie (Electricity Commissioners), A. C. Cramp (director, E.D.A.), and Mr. Frank Gill (past-president), who only the evening before had returned from China after 4½ years' absence. Response was made by Sir Henry Maybury (pres., Inst.C.E.), who expressed his conviction, based on knowledge of Sir Wm. Ray, that he would justify the hopes centred in him. He announced that the Institution of Civil Engineers was electing Colonel Crompton an honorary member. Sir John Brooke (vice-chairman, Electricity Commissioners), also responding, referred to the well-thought-out plans that Sir Henry Maybury had worked out for the main roads of this country, from which the electrical industry might well take example. He congratulated the President upon the part he had played in planning the grid. The speeches were commendably brief, and left plenty of time for the reunion which followed, during which we took the photographs reproduced on page 265.

The I.M.E.A. Convention

The annual convention of the Incorporated Municipal Electrical Association will be held at Liverpool from May 28th to June 2nd. The Duke of York has expressed his intention of attending the annual dinner to be held at the Adelphi Hotel, Liverpool, on May 30th. During his visit the Duke will visit the electrical exhibition at the Clarence Dock power station.

The Electrical Association for Women

A party of members of the local branch of the Association visited the Farnworth electricity works, Albert Road, on February 18th, when the engineer, Mr. A. J. Hutchinson, A.M.I.E.E., gave demonstrations of the effect of using cheap wiring and accessories, plugs, switches, lampholders, &c.

An Electrical Power Engineers' Dinner

Responding at the annual dinner of the Devon and Cornwall Section of the Electrical Power Engineers' Association, held recently at Plymouth, to the toast of "The Electrical Industry," proposed by Mr. G. E. Love, the Association's assistant national secretary, Mr. S. Carlile Davis gave an explanation of the position of the E.P.E.A. in relation to the grid. In submitting the toast, Mr. Love remarked that the industry had been progressing even during the depression, when other industries had not been so favourably situated. Mr. H. F. G. Woods, chief engineer of the East Devon Electricity Company, proposed the toast of the Association, and Mr. R. Toynbee (Leeds), president, responded. Mr. R. Ferguson (Newton Abbot), chairman of the Section, presided.

I.E.E. (North-Midland Centre) Dinner

The annual dinner of the North Midland Centre of the Institution of Electrical Engineers will be held at the Hotel Metropole, Leeds, on March 9th. Tickets (12s. each, exclusive of wines, for members, and 10s. each for students), can be obtained from Mr. W. R. T. Skinner, hon. secretary, 36, Park Place, Leeds.

A 22,500-b.h.p. Diesel Engine

A Diesel-electric generating set of a capacity of 22,500 b.h.p. (m.c.r.) has recently been installed at the municipal electricity works in Copenhagen, Denmark. The engine was built by Burmeister & Wain, Copenhagen, and is of the eight-cylinder two-stroke double-acting type. The diameter of the cylinders is 2 ft. 9 in., the stroke 4 ft. 11 in., and the speed 115 r.p.m. The whole flywheel effect is due to the rotor of the alternator. The engine occupies a space of approximately 24½ ft. by 65½ ft.; its height is 39 ft. 4 in. and its total weight nearly 1,200 tons.

The 19,000-kVA, 6.6-kV, 50-cycle generator was constructed by the Asea Co. The direct-coupled exciter has an output of 168 kW at 220 V. The generator is claimed to be the largest three-phase machine that has been built to date for direct coupling to a Diesel engine. The height of the generator from floor level to the upper limit of the stator is 18 ft. 3 in., and the lowest point lies about 15 ft. below the floor. The total weight of the machine is 187 tons, of which the stator with covers accounts for 88½ tons and the rotor without shaft 98½ tons.

Appointments Vacant

Assistant foreman in a factory at Cossipore for the Government of India.
Chief assistant electrical engineer for Ealing Corporation.
Meter tester and repairer for Hasting's Electricity Department.
(See our classified advertisements.)

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

The Central Hackney Conservative Association held a social recently at Hackney to express appreciation of the great services rendered to the borough by **Sir William Ray.** Local reports, as well as reports appearing in the daily Press, stated that Sir William had been appointed head of the "new great Central Electricity Board." The majority of the general public, not excluding local journalists, probably do not know the difference between the Board and E.D.A. Corrections have appeared in certain papers, however, making it clear that Sir Andrew Duncan is chairman of the Board. The Mayor of Hackney presented Sir William with a travelling case. In his reply, Sir William said that he was taking part in the approaching L.C.C. election in London, and every night from then until March 7th he had a speaking engagement in some part of London.

Viscount Elibank and **Sir Arnold B. Gridley** have been appointed directors of the Southern Areas Electric Corporation, Ltd., and Viscount Elibank is to be chairman.

Mr. R. B. Paul, agency manager for British Insulated Cables, Ltd., has arrived in South Africa.

Mr. Samuel Insull, according to a *Reuter* message, is to be allowed to remain in Greece on the ground of the serious condition of his health.

Mr. J. R. Hullah, of the sales staff of Messrs. Bruce Peebles & Co., Ltd., has transferred his office from Bradford to Leeds, and his new address is 4, Stainburn Mount, Moortown, Leeds.

Mr. D. C. Bastow, B.Sc., has been appointed to the sales staff of Messrs. Bruce Peebles & Co., Ltd. His address is 5, Stainburn Terrace, Moortown, Leeds.

We are informed by the Alton Battery Co., Ltd., that **Mr. B. C. Rhodes** will cease to represent the company in the Eastern Counties towards the middle of March.

Mr. H. G. Williams, M.Sc., M.Inst.C.E., M.P., has been appointed executive director of the Incorporated Association

Messrs. W. E. Highfield, J. M. Kennedy (president), and A. Brammer (general secretary) at the "Supervisors'" dinner.
(See page 289)

of Electric Power Companies. Mr. Williams is to take up his duties on March 1st.

Mr. W. Collinge is retiring from the Burnley Corporation Electricity Department after completing thirty years' service with that department.

Mr. L. Sterling, managing director of Electrical & Musical Industries, Ltd., has left on an important business trip to New York.

Mr. G. H. Jackson, general manager and engineer of the Northampton Electric Light & Power Co., Ltd., has been appointed a director of the company to fill the vacancy on the board caused by the death of Mr. A. H. Geldart, vice-chairman.

Mr. O. H. Hosking has been appointed chief assistant and station superintendent to the Watford Corporation electricity undertaking in succession to Mr. J. R. Jones, who has been appointed deputy electrical engineer to the Hammersmith Borough Council. Mr. Hosking is at present engineering assistant to the borough electrical engineer in the Croydon Electricity Department, and takes up his new duties on March 5th. He was joint author with Mr. L. A. Gripper of an article upon the safety regulations adopted by the Croydon undertaking which appeared in our issue of July 29th, 1932.

Mr. R. H. W. Denham, of the Doncaster staff of the Yorkshire Electric Power Co., Ltd., who was recently married to Miss M. M. S. Hancock, has been presented by his colleagues with a silver tea service.

Mr. R. W. Bierwagen, of Kitchener, Ontario, was elected president of the Ontario Electrical Contractors' Association at the winter convention of the Association held in Toronto last month.

Obituary

Sir Vincent Raven.—The death occurred on February 15th at Felixstowe at the age of seventy-five of Sir Vincent Raven, K.B.E., formerly technical adviser to the London & North-Eastern Railway Co. Sir Vincent was a pupil under the late Mr. Fletcher, of the North-Eastern Railway, and after passing through various positions in the chief mechanical engineer's department of that railway, was appointed head of the department in 1910. In 1915, at the request of Mr. Lloyd George, he took charge as chief superintendent at Woolwich Arsenal, and in 1917 received the honour of K.B.E. In May, 1917, he became deputy to Sir Eric Geddes, then Controller at the Admiralty, and at the beginning of 1919 he resumed the position of chief mechanical engineer to the North-Eastern Railway Co. He was a member of the Institution of Civil Engineers and a president of the Institution of Mechanical Engineers. He took a wide interest in railway electrification, of which he was a pioneer, and in our issue of December 30th, 1921, we reported an important paper read by him before the North-East Coast Institution of Engineers and Shipbuilders.

[Swain

The late Sir Vincent Raven

Mr. T. Dalling, engineer and manager of the Ross-shire Electric Supply Co., Ltd., died on February 17th at Evanton. Trained at Edinburgh Corporation power station, he studied at Heriot-Watt College, Edinburgh. When the Strathpeffer Electric Co. was incorporated in the present Ross-shire Electric Supply Co. in 1926, Mr. Dalling was appointed engineer and manager. He was chiefly responsible for the growth of the Strathpeffer Co., which supplies electricity from the hydro-electric station at Loch Luichart. During his management the output increased from 200,000 kWh to 1,500,000 kWh per annum.

Mr. P. D. Morgan.—We regret to record the death of Mr. P. D. Morgan, M.Sc., A.M.I.E.E., F.Inst.P., a member of the staff of the Electrical Research Association, which occurred on February 16th. For one whose death occurred somewhat unexpectedly at the comparatively early age of thirty-eight, Mr. Morgan combined marked scientific attainments with considerable administrative skill. A natural capacity for organisation and detail had led to his selection to superintend the Association's new laboratory now undergoing construction.

Mr. T. A. F. Cutler.—The death occurred on February 6th of Mr. Thomas A. F. Cutler, A.M.I.E.E., for many years meter superintendent at the Bath Corporation electricity works.

Mr. C. W. D. Bourne.—In our last issue we briefly recorded the death of Mr. Charles William Dunn Bourne, joint managing director of Messrs. Whipp & Bourne, Ltd., and vice-chairman of the Castleton Electric Co., Ltd. Mr. Bourne received his electrical training with the General Electric Co., Ltd., Salford, the Carnbrooke Telegraph Works, Hulme, and Messrs. Bertram Thomas, Hulme, and before his association with Messrs. Whipp & Bourne was foreman of the switch department of Messrs. Bertram Thomas. He was a member of the Rochdale Engineering and Machine Makers Employers' Federation, of which body he had acted as chairman for a period.

The late Mr. C. W. D. Bourne

Mrs. Holt.—The death occurred recently of Mrs. Holt, the wife of Mr. F. B. Holt, A.M.I.E.E., Manchester district engineer and manager for Higgs Motors, Ltd., and the daughter of Mr. G. Kershaw, chairman of the Whitworth U.D.C. Electricity Committee.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Cable Research, Ltd.—Private company. Registered February 15th. Nominal capital of £5 in 1s. shares. The objects are to carry on the business of electricians, telegraph and telephone engineers and contractors, manufacturers of electric cables of all descriptions, telegraph, telephone and wireless instruments, and other descriptions of electrical goods, wire drawers, galvanisers and wire rope makers, electrical, mechanical, railway and general engineers, &c. The subscribers (each with one share) are: S. Forshall and F. H. Webb, 2, Bond Court, Walbrook, E.C.4. Registered office: 2, Bond Court, Walbrook, E.C.4.

P. J. Gardner & Co., Ltd.—Private company. Registered in Edinburgh February 10th. Capital: £300 in £1 shares (150 6 per cent. preference and 150 ordinary). Objects: To carry on the business of manufacturers of and wholesale and retail dealers in all kinds of electrical appliances, ironmongery, &c. The first directors are: P. J. Gardner and Mrs. A. G. Gardner, both of 25, Weir Street, Coatbridge. Registered office: 25, Wellington Street, Glasgow, C.2.

Peacock & Porter, Ltd.—Private company. Registered in Edinburgh February 15th. Capital: £500 in £1 shares. Objects: To acquire the business carried on by R. Peacock, junr., & Co., 182, Trongate, Glasgow, C.1, as electrical contractors and engineers, radio and television engineers, electrical manufacturers and sign makers, &c. The first directors are: T. Porter, 10, Crookston Avenue, Cardonald, Glasgow, S.W.2, and R. Peacock, junr., 358, King's Park Avenue, Rutherglen. Registered office: 13, Dundas Street, Glasgow.

W. S. Steele, Ltd.—Private company. Registered in Edinburgh, February 10th. Capital: £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, dealers in and agents for, the sale and purchase of all kinds of electrical and other instruments, &c. The first directors are: W. S. Steele, D. Campbell, and Mrs. Mary Steele, all of 40, Blairgowrie Road, Cardonald, Glasgow. Registered office: 111, West Regent Street, Glasgow, C.2.

General Synchromatic Systems, Ltd.—Private company. Registered February 13th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in instruments or plant used in connection with electrical and mechanical apparatus, and to carry on the business of electrical, hydraulic, civil or consulting engineers, &c. The first directors are: L. Smith, E. L. Engel and R. T. D. Stoneham. Solicitors: Stoneham & Sons, 103a, Cannon Street, E.C.4.

S. H. Nicholls & Co., Ltd.—Private company. Registered February 13th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers and contractors, repairers of dynamos, motors, &c. The first directors are: D. F. Wiseman, 145, Conybere Street, Birmingham, and S. H. Nicholls, 270, Walsall Road, Perry Barr, Birmingham. Registered office: 145, Conybere Street, Birmingham.

St. George Radio Supplies, Ltd.—Private company. Registered February 14th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in wireless apparatus, electrical fittings, appliances, apparatus and accessories, &c. The directors are: H. G. Lovell, 387, Church Road, and A. G. Wilkins, 349, Church Road, St. George, Bristol. Solicitors: Cooke, Painter, Spofforth & Co., Bristol.

Nathaniel Jones, Ltd.—Private company. Registered February 12th. Capital, £200 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, suppliers of electricity &c. The first directors are: N. Jones and Catherine Jones, both of 43, Buckingham Road, Stratford, E.; and B. M. Jones, High Street North, East Ham. Secretary: Miss C. Jones. Registered office: 237, Baker Street, N.W.1.

Granton Instrument Co., Ltd.—Private company. Registered February 16th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of electrical and radio instruments, &c. The directors are: J. Webber (address not stated) and J. Grant, 86, Parkfield Road, New Moston, Manchester. Solicitors: Skelton & Co., 90, Deansgate, Manchester.

W.D. Radio Co., Ltd.—Private company. Registered February 16th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless apparatus, gramophones, &c. The subscribers are: G. R. Waygood, Abbey House, Westminster, S.W., and A. Waygood, 20, Ranelagh Gardens, Stamford Brook, W.6. Secretary: E. R. Waygood. Registered office: 122, Lambeth Walk, S.E.1.

Appleton's Radio (Tottenham), Ltd.—Private company. Registered February 16th. Capital, £1,000 in £1 shares (100 6 per cent. cumulative preference and 900 ordinary). Objects: To acquire the business now carried on by Lucy L. Appleton, as Empress Radio, at 126 and 680, High Road, Tottenham, Middlesex. The directors are: C. H. Appleton, "Uplands," Noak Hill, Billericay, Essex, and H. Vaughan, 34, Greyhound Road, Tottenham, N.17.

Lancashire & Cheshire Rediffusion Services, Ltd.—Private company. Registered February 17th. Capital, £25,000 in £1 shares (10,000 preference and 15,000 ordinary). Objects: To acquire the undertakings of the Wallasey Rediffusion Service, Ltd., and the West Lancashire Rediffusion Services, Ltd., and to operate a wireless relay service in the borough of St. Helens. The first directors are: S. R. Macdonald, "Elstan," Orchard Way, Esher, Surrey, W. W. Wakefield, 6, St. James Terrace, Regents Park, N.W.8, and F. Medlicott, 2, Creighton Avenue, Muswell Hill, N.10. Secretary, S. R. Macdonald. Registered office: Bush House, Aldwych, W.C.2.

Returns of Electrical Companies

A. E. Morrison & Sons, Ltd.—Mortgage on land with garage, &c., thereon in Gartree Street, Leicester, dated January 31st, 1934, to secure all moneys due or to become due from the company to Barclays Bank, Ltd. Satisfaction in full on January 19th, 1934, of mortgage or charge dated November 5th, 1931, and registered November 19th, 1931. (According to the register of mortgages, the only charge registered November 19th, 1931, was a memorandum of deposit which originally secured all moneys and liabilities incurred after October 23rd, 1931.)

Agro Electrical Co., Ltd.—Mortgage on 42, Buckingham Street, Aylesbury, dated February 6th, 1934, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Olympia Radio, Ltd.—Capital, £10,000 in £1 shares. Return dated September 28th, 1932. 4,702 shares taken up. £4,702 paid. Mortgages and charges at date of return, £6,500. Since registered, debentures dated October 31st, 1933, to secure £1,800.

Inventum Electrical Appliances, Ltd.—Capital, £500 in £1 shares. Return dated December 23rd, 1933. 52 shares taken up. £52 paid. Mortgages and charges, nil.

Credenda Conduits Co., Ltd.—Capital, £50,500 in £1 shares. Return dated November 7th, 1933. All shares taken up. £30,500 paid. £20,000 considered as paid. Mortgages and charges, nil.

Hailwood & Ackroyd, Ltd.—Capital, £25,000 in 3,200 preference and 1,800 deferred shares of £5. Return dated December 11th, 1933. All shares taken up. £15,500 paid. £9,500 considered as paid. Mortgages and charges, £50,000 sealed debentures.

H. A. Lee, Ltd.—Capital, £1,500 in £1 shares. Return dated January 13th, 1934. 1,350 shares taken up. £550 paid. £800 considered as paid. Mortgages and charges, nil.

Capel's Wholesale Wireless Co., Ltd.—The nominal capital has been increased by the addition of £5,000 in £1 ordinary shares beyond the registered capital of £1,000.

Phillips Brown (Manchester), Ltd.—The nominal capital has been increased by the addition of £10,000 beyond the registered capital of £5,000. The additional capital is divided into 4,500 ordinary and 5,500 unclassified shares of £1.

Rheostatic Co., Ltd.—Capital, £50,000 in 10,000 6 per cent. cumulative preference and 40,000 ordinary shares of £1 each. Return dated September 22nd, 1933. 19,490 ordinary shares taken up. £15,211 paid. £4,279 considered as paid. Mortgages and charges, £6,538 9s.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated October 25th, 1933. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges, £20,000.

Gravesend Radio Central Exchange, Ltd.—Capital £5,000 in 4,500 preference shares of £1 each and 10,000 ordinary shares of 1s. each. Return dated November 6th, 1933. All shares taken up. £4,000 7s. paid on 4,000 preference and 7 ordinary shares. £993 13s. considered as paid on 500 preference and 9,993 ordinary shares. Mortgages and charges, nil.

G. S. Hawker, Ltd.—Mortgage dated January 17th, 1934, to secure £650, charged on 15 and 17, Purley Downs Road, Croydon. Holders: National Building Society. Satisfaction to the extent of £550 on January 17th, 1934, of mortgage dated May 2nd, 1928, and registered May 7th, 1928.

Allen West & Co., Ltd.—Debenture dated January 31st, 1934, to secure £60,000, charged on properties in Woolston, Southampton and Preston, Brighton, and the company's undertaking and other property, present and future, including uncalled capital. Holders: Industrial & General Trust, Ltd., Pinners Hall, E.C.

Satisfaction to the extent of £10,000 on January 31st, 1934, of debenture dated February 21st, 1928, and registered March 1st, 1928. (According to the register of mortgages the debenture registered March 1st, 1928, originally secured £40,000.)

Rhondda Tramways Co., Ltd.—Satisfaction to the extent of £113,718 on August 16th, 1933, of trust deed dated March 24th, 1911, and supplemental trust deeds dated November 13th, 1912, March 11th, 1915, and May 8th, 1931, and registered April 3rd, 1911, November 19th, 1912, March 19th, 1915, and May 18th, 1931, securing £250,000 debentures. (Notice filed February 6th, 1934.)

Fox Industrial, Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £3,000. The additional capital is divided into 2,000 "A" shares of £1.

Peter Maurice Radio, Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £1,000.

Tubes, Ltd.—Capital, £215,000 in £1 shares. Return dated November 10th, 1933. All shares taken up. £107,584 paid (£1 per share on 82,859 and 10s. per share on 49,450 shares). £107,416 considered as paid (£1 per share on 82,691 and 10s. per share on 49,450 shares). Mortgages and charges, nil.

Ferranti, Ltd.—Capital, £900,000 in 500,000 7 per cent. cumulative preference shares of £1 and 800,000 ordinary shares of 10s. Return dated September 29th, 1933. 500,000 preference and 600,000 ordinary shares taken up. £353,834 paid on 353,834 preference shares. £446,166 considered as paid on 146,166 preference and 600,000 ordinary shares. Mortgages and charges, nil.

Medway Relay Service, Ltd.—The nominal capital has been increased by the addition of £5,000 beyond the registered capital of £7,000. The additional capital is divided into 4,000 preference shares of £1 each and 20,000 ordinary shares of 1s. each ranking *pari passu* with existing shares.

Mainud Starter, Ltd.—Debenture dated January 18th, 1934, to secure £500, charged on the company's property, present and

future, including uncalled capital. Holder: Ewart D. Jones, 461a, Caledonian Road, N.7.

Wireless Electrical and Road Installations, Ltd.—The nominal capital has been increased by the addition of £1,500 beyond the registered capital of £3,500. The additional capital is divided into 1,500 participating preference shares of £1 each.

Escott Bros., Ltd.—The nominal capital has been increased by the addition of £1,500 in £1 ordinary shares beyond the registered capital of £500.

Horsham Relay Service, Ltd.—Charge on 11, Devonshire Road, Horsham, dated January 20th, 1934, to secure £575 and any other money which may be or become due from the company to the Horsham Permanent Benefit Building Society.

Watson & Henderson, Ltd.—Issue on July 20th, 1933, of £500 debentures, part of a series already registered. (Notice filed January 31st, 1934.)

Electrobak, Ltd.—H. Crawshaw, 12, Willow Street, Accrington, ceased to act as receiver and/or manager on February 5th, 1934.

F. O. Coward, Ltd.—The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £1,500. The additional capital is divided into 1,000 6 per cent. cumulative preference shares of £1 each.

Husbands, Hart & Warburton, Ltd.—Capital: £3,000 in £1 shares. Return dated June 5th (filed December 27th), 1933. 1,503 shares taken up. £1,503 paid. Mortgages and charges, nil.

Falconar, Cross & Co., Ltd.—Capital: £7,000 in 3,500 preference and 3,500 ordinary shares of £1. Return dated July 13th, 1933. 3,300 preference and 2,002 ordinary shares taken up. £2 paid, £5,300 considered as paid. Mortgages and charges, £4,100.

H. Featherstone, Ltd.—Capital: £3,000 in £1 shares. Return dated August 18th, 1933. All shares taken up. £3,000 paid. Mortgages and charges, nil.

Scattergood & Johnson, Ltd.—Capital: £10,000 in 2,000 preference and 8,000 ordinary shares of £1. Return dated August 24th (filed November 7th), 1933. 7,928 ordinary shares taken up. £1,252 paid, £6,676 considered as paid. Mortgages and charges, nil.

Oxford Radio Supplies, Ltd.—Capital: £1,500 in £1 shares. Return dated August 15th, 1933. 1,400 shares taken up. £1,400 paid. Mortgages and charges, nil.

H. E. Keen & Co., Ltd.—Capital: £6,000 in £1 shares. Return dated August 23rd, 1933. All shares taken up. £502 paid, £5,498 considered as paid. Mortgages and charges, nil.

Amcolite, Ltd.—The nominal capital has been increased by the addition of £3,000 in £1 ordinary shares beyond the registered capital of £2,000.

Britannia Electric Lamp Works, Ltd.—Capital £15,000 in £1 shares. Return dated June 23rd (filed September 25th), 1933. 10,014 shares taken up. £10,014 paid. Mortgages and charges, nil. Return of allotments, made up to October 13th, 1933, shows a further 4,986 ordinary shares allotted, payable in cash and fully called up.

Hewittic Electric Co., Ltd.—Capital, £50,000 in £1 shares. Return dated August 10th, 1933. 40,000 shares taken up. £40,000 paid. Mortgages and charges, nil.

South Metropolitan Electric Tramways & Lighting Co., Ltd. (in liquidation).—Satisfaction in full on December 5th, 1933, of debenture stock secured by trust deed dated July 5th, 1906, and registered July 10th, 1906.

Wakefield Bros., Ltd—Chas. F. Farmroy, Danes Inn House, 265, Strand, W.C.2, ceased to act as receiver on February 3rd, 1934.

Magnacore, Ltd.—Fdk. F. Sharles, Salisbury House, London Wall, E.C.2, was appointed receiver and manager on February 7th, 1934, under powers contained in debenture dated February 23rd, 1933.

Maxim Lamps, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated January 25th, 1934, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Paramount Electric & Equipment Co., Ltd.—Capital, £500 in £1 shares. Return dated September 5th, 1933. Six shares taken up. £6 paid. Mortgages and charges, nil.

Glyncoiriog Electricity Supply Co., Ltd.—Capital, £1,500 in £1 shares. Return dated September 23rd, 1933. 1,000 shares taken up. £1,000 considered as paid. Mortgages and charges, nil.

Watliff Co., Ltd.—Capital: £10,000 in 7,000 7½ per cent. cum. preference and 3,000 ordinary shares of £1 each. Return dated August 31st, 1933. 3,040 preference and 3,000 ordinary shares taken up. £5,920 paid on 3,040 preference and 2,880 ordinary shares, £120 considered as paid on 120 ordinary shares. Mortgages and charges at date of returns, nil. Since registered Land Registration charge dated August 30th, 1933, to secure £750 and further advances not exceeding therewith £4,500. Returns of allotments show a further 2,060 preference shares allotted, payable in cash, and fully called up between September 19th, 1933, and January 22nd, 1934.

Kniveton Cable Works, Ltd.—Particulars filed of £2,000 debentures, authorised January 24th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £500.

Ionlite, Ltd.—Two notices of the appointment of R. W. West, C.A., 6, Broad Street Place, E.C., as receiver and manager on February 9th, 1934, (1) under powers contained in debentures dated June 22nd and July 6th, 1933, and (2) under powers contained in debenture dated December 15th, 1933.

City Notes

The Yorkshire Electric Power Co. held its annual meeting on February 20th, Mr. R. Armitage (chairman), presiding. In presenting the report and accounts (ELECTRICAL REVIEW, February 16th), the chairman said that at every annual meeting for some years past it had been necessary to refer to the depression in trade and industry, and it was with pleasure that he was now able to record that the trade improvement which began in the summer had resulted in a larger use of electric power, particularly by the textile trades and general power users. During the latter part of 1933 increased demands were made by all classes of users except for traction. The demand from authorised distributors for bulk supplies of electricity continued to grow and during the past year agreements had been made with the Bingley U.D.C. and the Dearne District Electricity Board for new areas. In addition to arrangements for reciprocal supplies, the company was now providing bulk supplies to twenty-three local authorities including two county boroughs, six urban districts, one Electricity Board, and four companies authorised to supply under forty-three Electricity Orders. The initiation of the North Lincolnshire undertaking was reported last year, and since then good progress had been made with the necessary mains and sub-stations and over twenty-five miles of underground and overhead distribution mains had been provided. A supply was made available to consumers in Lincolnshire for the first time in December last. It was intended to develop the Barton undertaking as part of the larger Lincolnshire scheme, and subject to the necessary arrangements being approved by the authorities concerned a reduction in the price of electricity in Barton would be made. By using the mains to supply electricity for such public purposes as street lighting, water pumping, sewerage and other services requiring power the cost of supplying the private user in farms and dwelling houses was reduced and the benefits of electricity could be made more widely available. It was gratifying to note that this aspect of the matter was being more and more generally appreciated by Government Departments and public authorities. Rural industries and intensive culture found electricity a valuable aid. They were already supplying 500 farmers, including dairy farmers, poultry farmers and market gardeners. Sugar beet, bacon factories and other rural industries were among their customers and their engineers were actively engaged in studying the problems of all agricultural applications of electricity so that they might help and advise intending users. The pension fund, which was proposed in 1928, had been deferred until now owing to the deepening trade depression, and it was proposed to set aside a sum of £30,000 for the establishment of this fund.

The North Metropolitan Electric Power Supply Co. recommends a final dividend on the ordinary shares of 6 per cent., making the total distribution for the year 10 per cent. The depreciation and reserve fund receives £245,384 (against £221,000), and £25,000 is again placed to contingency account. The depreciation and reserve account will be increased by net premiums received on the issue of share and loan capital. The balance carried forward is £35,665, against £29,469 brought in.

The report for 1933 states that approximately 170 miles of underground mains were laid and 25 miles of overhead lines were erected during the year, bringing the total length of mains and lines to 2,201 miles. The number of sub-stations was increased by 67 to 582. The sales of electricity increased from 298,700,000 to 352,500,000 kWh, and the number of consumers supplied either directly or indirectly from 185,800 to 218,700. The system was extended during the year to provide supply to eighteen additional villages and also to the London Transport Board's railway system between Arnos Grove and Cockfosters. The whole of the street lighting of St. Albans and Friern Barnet is now supplied from the company's mains. Seven new showrooms were opened. Reductions in electricity charges were made in the majority of districts and also to large power users. The company has acquired 93 per cent. of the issued ordinary shares of the Harrow Electric Light & Power Co., Ltd., and the electricity undertaking of the Bishop's Stortford, Harlow & Epping Gas & Electric Co. has been acquired. At the annual meeting to be held on February 27th a proposal will be submitted for converting the existing preference shares and ordinary shares into stock.

The North Metropolitan Power Station Co., Ltd., reports a revenue for 1933 of £92,908, against £66,472. The ordinary dividend is maintained at 6 per cent. Meeting: February 27th.

The Mid Southern Utility Co. reports a profit for 1933 of £86,689, as compared with £36,715 for the preceding year. After providing for interest charges, &c., and the statutory dividends for the first half of the year, it is proposed to pay the full statutory dividends of £6 1s. per cent. per annum on the "A" stock, £4 11s. per cent. per annum on the "B" stock, and £5 per cent. per annum on the "C" stock for the latter half of the year.

Presiding at the annual meeting on February 15th, Mr. R. W. Edwards (chairman) said that their Electricity Department, which at one time was the junior, had now become the senior, and was developing satisfactorily. The total advance in sales, as compared with 1932, represented 26.6 per cent., and the additional load was 3,720 kW, as compared with 2,960 kW in the previous year. Considerable extensions had recently been completed, the financial advantage of which had not been fully reaped. The prospect of further development was good, for a number of schemes were in hand.

The Ever Ready Co. (Great Britain), Ltd.—The subscription list opened on Monday last in an issue of 440,000 ordinary shares of 5s. each at 29s. 6d. per share. The new shares will rank for the full final dividend to be paid in respect of the year ending March 31st next. The dividends on the ordinary shares for the past seven years have been at the rate of 35 per cent. per annum. The company has agreed to purchase a further 170,000 ordinary shares of Lissen, Ltd., at 50s. per share, thus giving it 370,000 of the 400,000 issued Lissen ordinary shares, and the net proceeds of the present issue will be applied partly to the purchase of these shares and the balance to the expansion of the two businesses.

Lissen, Ltd., reports a profit for 1933, after meeting depreciation charges, &c., of £130,877, out of which £13,762 is provided for income-tax balance, 1933-34. The profit for 1932 was £174,359. The ordinary dividend is maintained at 12½ per cent., reserves receive £40,000 (against £80,000), and £34,716 is carried forward. The report states that the decline in profit was due to various rises in the cost of obtaining business against increased competition. There was an increase in sales of 6 per cent. The Ever Ready Co. (Great Britain) has been appointed manager of the business as from February 1st, 1934.

The Northampton Electric Light & Power Co., Ltd., reports a total revenue of £308,850 for the year ended December 31st last, and a net revenue of £118,343, which with income from investments and a balance brought in makes £134,823. After deducting debenture interest, general reserve receives £10,000 and reserve for cost of debenture conversion £10,000. It is proposed to pay a final ordinary dividend of 6 per cent., making 10 per cent. for the year, and to carry forward £11,691. The sales of electricity increased from 49,616,271 to 58,641,727 kWh, and the maximum load was 26,160 kW, an increase of 19½ per cent. The report records the death of Mr. A. H. Geldart, vice-chairman.

The Rushden & District Electric Supply Co., Ltd., reports a net revenue for 1933 of £12,249, which with a balance of £1,639 brought in makes £13,888. After deducting debenture interest, &c., it is proposed to pay a final dividend of 4½ per cent., making 8 per cent. for the year and to carry forward £2,102. The sales of electricity increased from 4,540,906 to 5,292,689 kWh. Meeting: February 27th.

The Westminster Electric Supply Corporation, Ltd., reports a balance from net revenue account of £140,232 for 1933, as compared with £150,766 in 1932, which with £26,162 brought in makes £166,394. It is proposed to pay a final ordinary dividend of 4½ per cent., making the standard dividend of 7 per cent. for the year, and to carry forward, subject to adjustment upon the determination of the new standard prices to operate from January 1st, 1932, £40,144. The sales of electricity increased from 85,889,066 kWh to 89,197,446 kWh, and the number of meters connected from 39,259 to 43,590. Meeting: February 27th.

The Bristol Tramways & Carriage Co., Ltd., reports a total revenue for 1933 of £1,148,127, as against £1,152,514 in the preceding year, and a net profit of £79,856 (against £81,164). It is proposed to pay a final dividend of 3 per cent., making 5 per cent. for the year, to place £10,000 to reserve for contingencies and renewals, and to carry forward £5,900, against £6,045 brought in. The number of passengers carried on the cars and omnibuses was 126,741,240, as against 125,383,560 in 1932. It is stated that the receipts from the tramways fell by £11,451. Meeting: February 23rd.

The St. James' & Pall Mall Electric Light Co., Ltd., reports a net profit for the year ended December 31st last of £79,309, as compared with £75,477 in the preceding year, which, with £59,532 brought in and £2,020 transferred from No. 2 reserve fund, makes £140,860. The final ordinary dividend is 4 per cent., making 7½ per cent. for the year (against 7 per cent.), and £70,941 is carried forward. The connections increased during the year from 45,282 to 48,428 kW, and the sales of electricity from 43,975,064 to 45,682,223 kWh. Meeting: February 27th.

The City of Buenos Ayres Tramways Co. (1904), Ltd., reports a balance for 1933, after receipt of the annuity payable under agreement by the Anglo-Argentine Tramways Co., of £67,356, as compared with £72,133 in 1932, to which is added £2,943 brought in making £70,299. A final dividend of 1s. 3d. per share, making 5 per cent. for the year, is paid, and after placing £7,000 to amortisation fund £1,299 is carried forward.

The Singapore Traction Co., Ltd., reports a profit for the year ended September 30th last, after charging debenture stock, interest, &c., of £29,830, which, with £5,691 brought in, makes £35,521. After providing for debenture stock redemption, depreciation and renewals, there is a balance of £13,777 available. It is proposed to pay a dividend of 2 per cent. on the 7 per cent. cumulative preference shares on account of arrears, and to carry forward £5,777.

The Mersey Railway Co. reports a net revenue for 1933 of £82,689, as compared with £82,710 in the preceding year. After providing for debenture interest, &c., it is proposed to maintain the dividend of ½ per cent. on the consolidated ordinary stock, to place £1,000 to general reserve, and to carry forward £4,502.

McMichael Radio, Ltd.—Presiding at the annual meeting on February 19th, Mr. L. McMichael (chairman) stressed the difficult conditions prevailing in the radio trade during the first part of the year. The extensions to the factory at Slough were completed in readiness for the 1933 season, and had been used to full capacity throughout the autumn and winter months.

The Tyneside Tramways & Tramroads Co. reports a profit for 1933, subject to interest on mortgages, of £5,332, as compared with £5,204 in 1932, to which is added £55 brought in, making £5,387. After deducting interest on mortgages (£4,043) and transferring £1,280 to prior mortgage redemption fund, £64 is carried forward.

Shanghai Electric Construction Co., Ltd.—At an informal meeting of shareholders held recently it was decided to organise opposition among English shareholders to the proposed transfer of the control of the company from London to Shanghai. The proposal is to be submitted to an extraordinary meeting to be held on March 14th.

Companies Struck Off the Register.—The names of the following companies have been struck off the Register, and they are thereby dissolved :—

Anex Radio, Ltd.; Electric Lamp Distributors, Ltd.; Hunter Radio, Ltd.; Pegwin Electric Supplies, Ltd.; Red Triangle Electric Co., Ltd.

The Direct Spanish Telegraph Co. has announced a dividend of 6 per cent. on the ordinary shares for the year (same).

Charles Clifford & Son, Ltd., report a profit for 1933 of £8,080, which with a balance brought in makes £38,950. It is proposed to pay a final ordinary dividend of 1s. 6d. per share, making 10 per cent., tax free, for the year, and to carry forward £31,150.

Mather & Platt, Ltd., report a net profit for 1933 of £112,139, as against £106,978 in the preceding year. A final dividend of 3½ per cent. is proposed, again making 6 per cent. for the year, and £22,346 is carried forward.

The London Passenger Transport Board has announced that, owing to various schemes being in suspense, it is necessary to postpone consideration of an interim dividend on the "C" stock.

The Midland Electric Manufacturing Co., Ltd., has announced a dividend of 10 per cent. for the year, plus a bonus of 12½ per cent., less tax (unchanged).

The Chiswick Electricity Supply Corporation, Ltd., reports a profit for 1933 of £31,871, as compared with £32,986 in the preceding year. The final dividend is 6 per cent., making 11 per cent. for the year (same), and £7,835 is carried forward.

The Dublin United Tramways Co. (1896), Ltd., reports a net profit of £77,040 for 1933 (against £75,252 for 1932). The ordinary dividend for the year is maintained at 3 per cent., and £14,374 is carried forward.

The Midland Counties Electric Supply Co., Ltd., has declared a final dividend of 4½ per cent., maintaining the distribution for the year at 7 per cent.

The Pennsylvania Water & Power Co. has announced a quarterly dividend of 75 cents per share on the common stock (same).

The North Eastern Electric Supply Co., Ltd., has declared a final dividend of 3½ per cent. on the ordinary shares, making 6 per cent. for the year (same).

The County of London Electric Supply Co., Ltd., has announced a final ordinary dividend, subject to audit, of 7½ per cent., maintaining the year's distribution at 10½ per cent.

The South London Electric Supply Corporation, Ltd., has announced a final dividend of 4 per cent. on the ordinary shares, subject to audit, making 7 per cent. for the year, against 7 per cent. and a capital bonus of 8 per cent. in 1932.

Clarke, Chapman & Co., Ltd., have decided not to pay a dividend on the ordinary shares for 1933. For 1932 the dividend was 3¾ per cent.

The Clyde Valley Electrical Power Co. has declared a final dividend of 4 per cent. on the ordinary shares, making 7 per cent. for the year (unchanged).

Stocks and Shares

TUESDAY EVENING.

FROM present indications in some of the more speculative markets of the Stock Exchange it would appear as though the recent fever for gold and other mining shares had flamed a little too high for the financial convenience of all those who lit the bonfire. In other words, some people bought more than they could conveniently pay for, or otherwise negotiate, with the result that sales have had to be made, in other directions, in order to meet the money required for the financing of the speculators' purchases. Such selling has been met, however, by pronounced support on the part of people who, with more money than they know what to do with, are glad to have the opportunity for picking up good stock when it comes in. The net result of these two cross-currents—there are, of course, many other influences at work, but these are two of the most important—is to leave in a quiet condition business in the Stock Exchange markets, while at the same time prices of investment securities are well maintained.

Gilt-edged Stocks

London & Home Counties 4½ per cent. stock of 1955-1973 has improved to 109, and the "B" stock of the London Passenger Transport Board at 119 is ½ down. These are the only two changes in the gilt-edged market. Amongst Trade Facilities Acts stocks, £500 North Wales Power 4½ per cent. has come on offer at 105¼. The stock is dated 1930-1953. It yields at the present price 4¼ per cent. outright, but no more than £3 19s. per cent. to redemption, estimating the life of the issue at twelve years. The stock can be paid off, however, at any interest date by six months' notice. A few hundred pounds of West Midlands Joint Electricity Authority 5 per cent. stock, 1948-1968, is obtainable at 115¼, free of stamp. This pays £4 6s. 6d. per cent. outright; redemption can be effected at 100 on or after April 1st, 1948. Interest payments are due on the 1st of April and October. Bankside Investment Trust fifty-year mortgage debenture stock, guaranteed up to the year 1971 by the City of London Electric Lighting Company, has risen to 123. About £5,000 can be bought, giving a return of £4 1s. per cent. on the money. Interest is due in January and July. The security is gilt-edged. Repayment takes place in 1982, at 105.

New Issues

The new issue of the Galloway Water Power debenture stock, of which £1,350,000 was offered last week at 101½, attracted prompt subscription. As soon as the allotment letters were out, dealings started on the basis of ½ premium, the premium being quickly doubled. The Ever-Ready Company made an issue on Monday in this week of 440,000 ordinary shares, of 5s. each, at 29s. 6d. The money was required in part for

the purchase of 170,000 Lissen ordinary at 50s. The purchase gives the Ever-Ready Company 370,000 out of the 400,000 issued shares of Lissen. The price of the new issue came very close indeed to that of the existing shares, which are now quoted at 29s. Ever-Ready Trust shares strengthened to 22s. 6d. The Lissen annual report shows a decline in net profits of about £43,000, owing, the directors state, to increasing competition. The dividend on the ordinary shares is repeated at 12½ per cent.

Electricity Supply Shares

The placid satisfaction with the announcement of standard dividends by several of the London electric supply companies has been pleasantly stirred by the declaration by the St. James' & Pall Mall Electric Light Company of a final dividend that made 7½ per cent. for the year. This came by way of surprise, but the increase in dividend is fully justified by the profit for the year. The Westminster Supply Corporation has also done well. The profits are £21,000 up, and the dividend is maintained at the standard rate of 7 per cent. per annum. The North Metropolitan Electric Power Supply Co. shows an increase of £69,000 in the year's revenue. The dividend is again 10 per cent. on the ordinary. Chiswick Electricity Supply Corporation's profits at £31,781 are £1,100 down; the dividend, making 11 per cent. for the year, is unchanged. No changes of consequence have occurred in the list of prices. Edmundson's ordinary at 39s. 6d. are a trifle up. Electrical Distribution of Yorkshire improved to 48s. 9d., showing a gain of 1/6, on account of the modest bonus to which the proposed new issues of shares will entitle the proprietors. Electrical Finance 7 per cent. preference and Lancashire Electric sevens are harder at 31s. and 37s. respectively.

Home Railway Stocks

The Southern Railway has made the best showing in the list of the home railway dividend announcements in respect of the year 1933. The net revenue was over half a million higher, and the company's preferred stock is to receive 3 per cent. dividend as against 1 per cent. for 1932. The report shows that the directors intend to extend the electrification of the railway by 23 miles. A further expenditure on capital account is to be made this year, £600,000 being allocated to electrification. The stocks of the company have responded to the results achieved, and a question often discussed in Stock Exchange circles is which of the two stocks is the better purchase: that of the Southern Railway, on its electrification progress, or London Midland & Scottish, whose supporters point to the increased industrial activity in the Midlands.

The decision of the London Passenger Transport Board to pay no interim dividend on the 23½ million pounds of "C" stock, while it met the expectation of a good many people, aroused a shade of disappointment. Too many matters are under investigation in connection with the pooling scheme for the Board to be able at this juncture to say how much revenue is available for payment to holders of the "C" stock. At 83, the "C" stock is a point lower.

Cables and Wireless

The January index figure issued by Imperial and International Communications makes a better showing than that of twelve months ago, but the index of 71.8 goes against 76.7 recorded in December last. December is a better "traffic" month than January, so the drop in the index number as compared with last month is of no particular account, and the January figure may be regarded as satisfactory. Prices of the preference and the junior ordinary stocks have scored moderate gains. Anglo-American Telegraph preferred is better at 113½. Great Northerns are ¼ down to 36. Lively speculation in Canadian Marconi shares lifted the price to 15s. 3d. Most of the trade pointers which come nowadays from Canada indicate a material recovery in the business conditions of the Dominion. This is reflected also in the improvement amongst the prices of Canadian utility companies. Some little attention is being paid to British Columbia Power Corporation shares. The "A" are in receipt of quarterly dividends, and give a return of nearly 5½ per cent. on the money at the present price of 27¾. The "B" shares have had no dividend. Their current quotation is 6½.

American Telephone and Telephones at 120½ and Internationals at 15½ are almost unaltered. A snowstorm in New York caused the Wall Street Stock Exchange to open an hour later than usual on Tuesday.

Manufacturing and Equipment

The official price of Enfield Cables ordinary shares is erroneously given as 4½, but the actual quotation is 86s. 3d. The latter represents a further fall of 3s. 9d. as compared with a week ago. Enfield Rolling Mills keep their previous price of 29s. Philips Incandescent Lamps at 47s. 9d. are down 1/6, the decline, like that in Great Northern Telegraphs, being due to uneasiness of possible Continental disturbances as sequelae to the tragic death of the late King Albert. Arons retain their advance to 54s. 9d. Associated Electrical Equipments have come into favour and are 2s. 6d. higher at 35s. A shilling rise lifted British Aluminiums to 32s. On the other hand, Telegraph Constructions have receded to 26s. 3d. Radio Central Exchanges made their appearance in the market at a small premium and these 5s. shares are quoted at 5s. 1½d.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1931.	1932	Price, Feb. 20.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	78/3	—	3 17 0
Brompton Ordinary	1	8½	7	34/-	—	4 2 4
Charing Cross Ordinary	1	8½	7	34/6	—	4 1 2
Chelsea	1	8½	7	34/-	—	4 2 2
City of London	1	10	10	35/-	—	4 0 0
Clyde Valley	1	7	7	41/3	—	3 8 6
County of London	1	10½	10½	56/3	—	3 14 9
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	48/9	+1/6	3 13 9
Elec. Supply Corporation	1	11	11	76/3	—	2 17 8
Kensington Ordinary	1	8	7	34/6	—	4 1 1
Lancs Light and Power	1	7	7	37/-	—	3 15 8
London Electric	1	9	7	34/6	—	4 1 1
Metropolitan	1	10	10	54/6	—	3 13 3
Midland Counties	1	7	7	38/9	—	3 12 2
Mid. Elec. Power	1	8	8	44/6	—	3 12 0
North Eastern Electric Ordinary	1	6	6	35/-	—	3 8 6
Do. 7% Pref.	1	7	7	34/-	—6d.	4 2 4
Northampton	1	10	10	55/-	—	3 12 1
Notting Hill 6% Pref.	10	6	6	13½	—	4 8 11
North Met. Elec. Ordinary ...	1	—	10	3⅛	—	3 2 0
Do. do. 6% Pref. ...	1	6	6	30/-	—	4 0 0
St. James' and Pall Mall	1	8	7	35/-	—	4 0 0
Scottish Power	1	8	8	2⅛	—	3 17 8
South London	1	8½	7	34/6	—	4 1 1
Westminster Ordinary	1	8½	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	47/6	—	3 7 4

PUBLIC BOARDS.

Central Electricity, 1950–70 ...Stock	5	5	111	—	4 10 1
Do. -1955–75 ... „	5	5	114	—	4 7 0
Do. 1951–73 ... „	4½	4½	108	—	4 5 0
Do. 1963–93 ... „	—	3½	94½	—	3 14 1
London & Home Counties, 1955–75 „	4½	4½	109	+1	4 2 7
London Passenger Transport, A ... „	—	4½	116	—	3 17 7
Do. do. B ... „	—	5	119	—½	4 4 0
Do. do. C ... „	—	—	83	—1	—
West Midlands Joint Elec. 1948–68 „	—	5	114	—	4 7 0

TELEGRAPH AND TELEPHONES.

American Tel. & Tel. $100	9	9	120½	—	7 9 4
Anglo-Am. Tel. Pref. ... ... Stock	6	6	113½	+1½	5 5 9
Do. Def. ... ... „	1½	1½	28	—	5 7 2
Cables & Wireless 5½% Pref. ... „	2¾	2¾	72½	+1	3 15 10
Do A 7½% Ord. ... ... „	Nil	Nil	24	—	—
Do. B. Ord. ... ... „	Nil	Nil	11	+½	—
Globe Tel. and T. Ord. 10	Nil	2½	10	—	2 10 0
Do. do. Pref. 10	6	6	12½	+½	4 16 0
Great Northern Tel. 10	20	20	36	—½	5 11 1
Marconi-Marine 1	10	7½	30/-	—⅛	5 0 0
Oriental Telephone Ord. 1	12	12	3½	—	*3 16 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref. ... 5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref. 5	Nil	Nil	1/6	—	—
Do. do. 5% Deb. ... ... Stock	Nil	Nil	6	—	—
British Electric Traction Df. Ord. „	5	5	490	—	—
Do. do. Pref. Ord. ... ... „	8	8	152½	+5	5 5 0
Brazil Traction 100	—	—	12½	—⅛	—
Brit. Columbia Elec. Rly. Pce. ... Stock	5	5	102½	+2	4 17 0
Mexico Trams, 5% Bonds ... —	5	5	22½	—	22 4 4
Mexican Light Common 100	Nil	Nil	8	—	—
Do. 7% Pref. 100	7	7	11	—	—
Do. 1st Bonds ... ... —	5	5	47½	—	10 10 0
Victoria Falls Ord. 1	15	20	5½	—⅛	3 15 0
Yorkshire (West Riding) 1	Nil	Nil	18/9	+1/9	—

MANUFACTURING COMPANIES.

Assoc. Elec. Ord. 1	4	4	19/9	—	3 18 3
Do. Pref. 1	8	8	31/3	—	5 2 8
Babcock & Wilcox 1	14	9	42/0	—6d.	—
British Aluminium Ord. 1	5	5	32/-	+1/-	3 2 6
British Insulated Ord. 1	15	15	73/9	—	4 1 4
Brush Ord. ... ... Stock	Nil	Nil	40	—	—
Callender's 1	15	15	62/6	—	4 16 0
Do. 6½% Pref. 1	6½	6½	30/9	—	4 4 0
Crompton Parkinson Ord. ... 5/-	22½	12½	25/-	—	—
Do. 8% Pref. 1	8	8	31/3	—	5 2 5
Edison-Swan 1st Pref. 1	7½	7½	24/6	—	6 2 5
Do. 5% Deb. ... ... Stock	5	5	102½	—	4 17 7
Electric Construction 1	Nil	Nil	10/-	—	—
Enfield Cable Ord. 1	25	25	86/3	—⅛	5 15 9
English Electric 1	Nil	Nil	6/3	—	—
Do. do. Pref. 1	Nil	Nil	8/9	—	—
Ever Ready 5/-	35	35	20/-	—1/-	6 0 8
Ferranti Pref. 1	7	7	26/6	—	5 5 9
G.E.C. Pref. 1	6½	6½	30/-	—	4 6 8
Do. Ord. 1	8	8	44/6	—	3 12 1
Henley's 1	30	30	6⅛	—	4 15 6
Do. 4½% Pref. 5	4½	4½	5½	—	4 5 9
India-Rubber Preferred 1	—	—	15/-	—	—
Johnson & Phillips 1	5	5	21/3	—	4 14 1
Siemens Ord. 1	7½	6½	20/9	—	—
Telegraph Construction £1	Nil	Nil	26/3	—⅛	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1932

14917. "Electrolytic coating of metals with other metals." S. O. Cowper Coles and Febrite, Ltd. May 26th, 1932. (404972.)
17435. "Electric motors." Burroughs Adding Machine Co. August 14th, 1931. (404935.)
18140. "Electric circuit-breakers." International General Electric Co., Inc. June 25th, 1931. (405000.)
18345. "Control of five-electrode thermionic valves." Igranic Electric Co., Ltd., and L. H. Paddle. June 29th, 1932. (405004.)
18683. "Electrical sound-recording apparatus." Decca Record Co., Ltd., and N. D. Angier. July 11th, 1932. (405037.)
18865. "Sound-modifying devices for loud-speakers or the like." W. R. Millar. July 14th, 1932. (404937.)
20502. "Television." Pye Radio, Ltd., and P. C. Goldmark. July 20th, 1932. (405006.)
20847. "Thermionic valve amplifiers." A. H. Midgley. July 23rd, 1932. (404981.)
20855. "Traffic control signals." Automatic Electric Co., Ltd., and P. B. Renshaw. July 23rd, 1932. (404949.)
21311. "Radio signalling systems." Marconi's Wireless Telegraph Co., Ltd., and A. A. Linsell. July 28th, 1932. (405018.)
21312. "Radio and other modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., and W. T. Ditcham. July 28th, 1932. (405019.)
21379. "Electric lampholders." J. A. Crabtree. July 29th, 1932. (405023.)
21398. "Electric gramophone motor units." A. A. Juviler. July 29th, 1932. (405024.)
21415. "Keying arrangements for high-frequency signalling systems." C. Lorenz Akt.-Ges. August 5th, 1931. (405025.)
21416. "Carrier-current transmission system." Standard Telephones & Cables, Ltd. August 14th, 1931. (405026.)
22024. "Apparatus for transmitting indications or movements to a distance." Elliott Bros. (London), Ltd., and G. F. Shotter. August 5th, 1932. (Cognate application 10320/33.) (405043.)
22484. "Electric trolley wires or conductors." N. E. North. August 11th, 1932. (405048.)
22597. "Switching for long-, medium- and short-wave superheterodyne wireless receivers." J. G. S. Nott and W. J. C. Nott. August 12th, 1932. (405049.)
22664. "Electric control systems utilising electric discharge devices." British Thomson-Houston Co., Ltd. August 12th, 1931. (405052.)
23348. "A.c. electricity meters." Ferranti, Ltd., and V. Z. de Ferranti. August 19th, 1932. (405055.)
25824. "Portable power generating set." Douglas Motors (1932), Ltd. (in liquidation), and C. G. Pullin. September 16th, 1932. (Cognate application 26956/32.) (405064.)
29300. "Methods of, and apparatus for, modulating radiant energy." Western Electric Co., Ltd. (Electrical Research Products, Inc.). October 19th, 1932. (405078.)
34169. "Electric selective remote control and/or signalling systems." Avions R. Couzinet. December 4th, 1931. (405091.)
35528. "Control of selecting switches for use in automatic telephone and other selective systems." Siemens Bros. & Co., Ltd., and H. E. Humphries. December 17th, 1932. (405096.)

1933

1130. "Single-phase induction motors." English Electric Co., Ltd., L. Roberts and R. D. Ball. January 12th, 1933. (Addition to 386512.) (405105.)
4350. Interference preventative devices for electrical apparatus." Electrolux, Ltd. March 7th, 1932. (405113.)
4353. "Method of and apparatus for detecting flaws in an electrical conductor." Sperry Products, Inc. February 12th, 1932. (Cognate application 4354/33.) (405114.)
4841. "Electric filters." G. W. Pierce. February 16th, 1933. (405117.)
4894. "Electric battery lamps for bicycles." E. Lewis. February 17th, 1933. (405118.)
5804. "Wireless and like receiving systems." Hazeltine Corporation. April 6th, 1932. (Cognate application 5805/33.) (405124.)
8696. "Transmission and automatic registration of signals in automatic telephone installations." E. Zoller and J. Villiger. March 24th, 1932. (405133.)
9634. "Electric couplings provided with fuses." J. A. Fried. March 30th, 1933. (405135.)
11575. "Screening grids for X-ray photography." Dr. F. Hansen. April 20th, 1932. (405146.)
12159. "Control of the supply of electric current to illumination and other systems." Igranic Electric Co., Ltd. May 31st, 1932. (405148.)
12875. "Electrolytic condensers." Dubilier Condenser Co. (1925), Ltd. May 5th, 1932. (405151.)
13156. "Electromagnetic device for turning the headlights of motor vehicles." G. Klarenaar and B. Franz. May 5th, 1933. (405154.)
15108. "Electric supply systems." Sulzer Frères Soc. Anon. June 4th, 1932. (405164.)
16572. "Method of introducing a local oscillator voltage in the grid circuit of the frequency changer of a superheterodyne radio receiver." Cromwell (Southampton), Ltd., and H. A. Brooke. June 9th, 1933. (405175.)
16575. "Electric discharge tubes." C. H. F. Muller Akt.-Ges. June 23rd, 1932. (405176.)
18100. "Feeding of rectifiers." Akt.-Ges. Brown-Boveri et Cie. June 21st, 1933. (405183.)
20521. "Screening device for sparking plugs of internal combustion engines." A. Tebaldi. July 27th, 1932. (404967.)
21176. "High-potential cables." British Thomson-Houston Co., Ltd. July 28th, 1932. (404958.)
22157. "Holders for discharge lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 27th, 1932. (405210.)
27101. "Facsimile transmission systems." Westinghouse Electric & Manufacturing Co. September 30th, 1932. (405227.)
28440. "Incandescent wire ignition plugs." R. Bosch Akt.-Ges. October 27th, 1932. (405229.)
31739. "Electric discharge devices." British Thomson-Houston Co., Ltd. November 16th, 1932. (405232.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 14th.

Equity (lettering and design). No. 546464. Class 8. Radiotelephonic receiving apparatus and parts thereof.—Regentone, Ltd., Regentone Works, Worton Road, Isleworth, Middlesex.

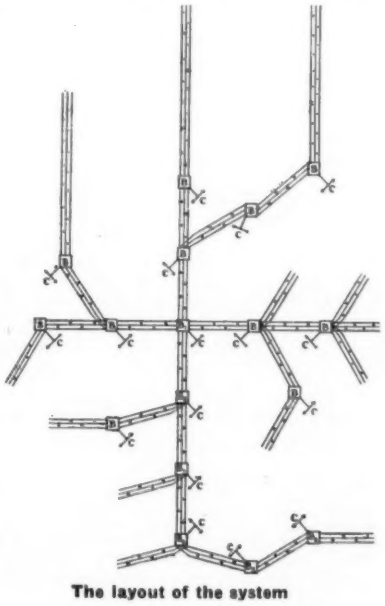
Vinylite. No. 547405. All goods in Class 11.—Carbide & Carbon Chemicals Corporation, New York. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Lighting Control Over a Large Area

A SYSTEM of control installed at Mulhausen by Mr. A. Mieg (chief engineer), Upper Rhine Power Co., consists in the connection of one lighting circuit with the switch box of the second so that the control of one actuates the other.

The accompanying diagram represents the lighting system. Each switch-box B contains a commutator - relay which obeys the action of the preceding lighting circuit, the control motor obtaining its energy from the l.v. mains at C.

The initial control is effected by hand or automatically on the commutator relay placed in B_1; each circuit then is switched in automatically in sequence. In each switch-box there is a little spring-controlled switch allowing for operation by hand. All the commutator relays are identical and operate either on a.c. or d.c. at 110 or 220 V. A.c. circuits can be controlled by d.c. and *vice versa*. The primary rotating commutator is operated by a motor controlled by two relays. These mutually controlled circuit groups can be prolonged as required in an outward or inward direction, and several circuits can be operated in parallel from one box. The switching on of each relay takes about 15 seconds, and therefore with ten circuits in cascade, which represents the control over a material road distance, the operation will take not more than 150 seconds. Lighting-up times can be arranged to suit temporary and local requirements.



The layout of the system

In Mulhausen, where there are several groups of cascade circuits, the following arrangements are made. At nightfall two series of lamps are switched in, namely, half-night and all-night; at midnight the half-night lamps are switched off; at daybreak the half-night lamps are switched on momentarily and then all are extinguished automatically. The momentary switching on of the half-night lamps before the closing-down is to prevent an accidental cutting-off of current to one sub-circuit operating to cut out succeeding circuits.

The commutating relays are so arranged so that they can only be operated in a prearranged sequence. The relay gear is placed in small lock-up street boxes arranged at a convenient height. By means of a special change-over switch sub-circuits can be tested. One of the lighting staff is sent to a final point of a cascade circuit at lighting-up time to note the operation; if it fails to act, then the faulty relay must be at the end of the last lighted section.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Cinema, George Street, and office and alterations to 34, Albyn Place, for Scottish Oils and Shell-Mex, Ltd.; T. S. Sutherland, architect.

Altrincham.—Houses (100), Craven Road Estate; H. E. Brown, U.D.C. surveyor.

Ashton-under-Lyne.—Flats and houses, Hurst; J. Ridyard & Sons, Ltd., builders.

Aylesbury.—Extensions, Royal Bucks Hospital (£30,000); secretary.

Barnet (HERTS).—Engineering works, Wellhouse Hospital (£4,500); county surveyor.

Barnsley.—School (500 places), Monk Bretton; director of education.

Bath.—Technical college (£23,000); Long & Son, builders.

Batley.—Houses (26), Church Road, Brookroyd, for W. & J. C. Farrar.

Birmingham.—Residential flats, "Copthorne Court," Calthorpe Road, Edgbaston (£30,000), with electrical work; B. Whitehouse & Son, builders, Monument Road.

Blackpool.—Construction of indoor swimming pool and solarium, ballroom, café, &c., at the junction of Rawcliffe Road and Lytham Road, South Shore (£25,000), for Alan Gott, Upper Talbot Street; J. T. Gabbott, builder, Thorn Street, Preston.

Blyth.—Swimming pool (£16,000); L. G. Mouchel & Partners, engineers.

Bootle.—Houses (108), Caddick Estate (£35,000); W. A. Gale, Ltd. Houses (60), Marsh Lane (£19,180); T. E. Dooley.

Bradford.—Houses (34), Pollard Lane and Beech Grove; L. D. Sunderland, contractor, 331, Highfield Road, Idle. Completion of new infirmary, Daisey Hill (£500,000), for the Royal Infirmary.

Bridlington.—Houses (42); borough surveyor.

Caithness.—Schools, Lybster and Wick, for C.C.; Master of Works, County Education Committee, Wick.

Carlisle.—Houses (30), London Road; T. Irwin & Sons, Ltd. Library enlargement (£8,850); city engineer.

Cheshire.—School, Cheadle Hulme (£14,000), for County E.C.: F. A. Browne, county architect, Chester.

Chester.—School, the Lache (£15,126), for E.C.; John Hughes (Contractors), Ltd., builders, Wrexham.

Chippenham.—Public offices and council chamber; borough surveyor.

Cosham.—Wireless station, Southampton Road; Hants Relay, Ltd.

Dartford.—Houses (26), Princes Road; J. Franklin & Co.

Dewsbury.—Houses (28), Dawgreen Clearance area; T. Blakeley, architect, Town Hall.

Doncaster.—Council school; F. Kirby, architect, Municipal Offices.

Dorset.—Nurses' home, Poole Institution (£7,500), and extensions to Sturminster, Weymouth and Poole Institutions (heating and electrical work); county architect, Dorchester.

Dukinfield.—Houses (26) for Marsh, Warrington, Ltd.

Durham.—Elementary schools, Billingham and Hordon; county architect.

Ebbw Vale.—Houses (40), Glyncond; P. I. Davies, engineer. Council Offices.

Edinburgh.—Addition to works, Leith, for the British Oil and Cake Mills, Ltd., Seafield; the manager.

Essex.—School (450 places), Rush Green, Dagenham, for County E.C.; J. Sargeant, director of education, Chelmsford.

Faversham.—Houses (23); borough surveyor.

Gillingham (KENT).—Town hall, the Park; borough surveyor.

Glasgow.—Houses, Clarkston; John Lawrence (Glasgow), Ltd. Houses (42), Kelvindale Road, (78) Old Shettleton Road, and (96), South Chester Street; housing director and trade contractor. Houses, Wedderlea Drive, Cardonald; Glasgow Estates Development Co. Shops, Allander Street, Possilpark; Felix M'Court.

Gosforth.—Houses (44) for Cussins (Contractors), Ltd., Wellburn Estate, Newcastle-on-Tyne. Cinema (1,443 seats), Great North Road; Marshall and Tweedy, architects, 129, Pilgrim Street, Newcastle-on-Tyne.

Gosport.—Houses, borough surveyor.

Great Yarmouth.—Houses (120); G. H. Holmes, builder.

Halesowen.—Houses (96), Witley Lodge Estate, for S. G. Marsh. Houses (34), Alexandra Road; A. & J. Mucklow.

Halifax.—Houses (40), Hillcrest Estate; Hillcrest Building Estate Co., Ltd., Summergate Place.

Hamilton.—Houses (200); burgh surveyor.

Hebburn-on-Tyne.—Houses (50) for aged people (£10,300): J. A. M. Henderson, U.D.C. Building Superintendent.

Hemel Hempstead.—Extensions to institution (£21,083); E. Mills, Beaconsfield.

Hertfordshire.—Dairy and offices, Agricultural Colony (£6,000), and school centre, Bedford Road, Letchworth; extensions to Mental Hospital, Hill End (£27,556), and improvements to Western House Institution, Ware (£5,670); county surveyor.

Hyde.—Houses (30), Hallbottom Estate; borough engineer.

Inverness.—School, Inverness (electrical work), for County E.C.; Reid & Forbes, architects, 17, Great Stuart Street, Edinburgh.

Irish Free State.—(NENAGH, CO. TIPPERARY).—Houses (111); W. J. Chadwick, town surveyor, Town Hall.

Kendal.—Houses (72); A. Schofield, builder. Houses (120) for the Kendal and District Housing Society, Ltd.; secretary. Houses (30), Spital, for Patersons (Windermere), Ltd.

Kent.—Schools, Westwood (Welling), Hurst (Bexley), and Brampton Road, Bexley Heath, and Technical College, Dartford; county architect, Maidstone.

Kidderminster.—Shops and offices, Blackwell Street, electrical work (£40,000); Towers, Wilson & Co., builders, Wolverhampton.

Knottingley.—Houses (36); G. Laverick, surveyor, Town Hall.

Lanarkshire.—Police station and quarters, Carluke (£5,000), for C.C.; county surveyor, Renfield Street, Glasgow.

Lancaster.—School (£6,855); R. Gallagher, Ltd., Blackhill.

Leeds.—Extensions, General Infirmary (£250,000); governors.

Lincolnshire.—School, Spalding, for County E.C.; director of education, Spalding.

Littlehampton.—Shops, Bayford Road; W. J. White & Sons, Ltd.

London.—(ACTON).—Houses (36), Park View Road; W. F. Ferris, Ltd. Houses, in five years (£150,000), and isolation hospital, extensions (£15,000); borough engineer. (EALING).—Flats (84), Shelley Avenue; Home Counties Builders, Ltd. Factory, Park Avenue, for R. H. A. Hunt; F. E. Simpkins, architect, Park Royal Road, N.W.10. Factory, Coronation Road; Sir A. Gibb & Partners. Factory, Willesden Lane; F. W. Ferris, Ltd. Factory for the Universal Power Drives, Aintree Road; Percy Bilton, Ltd., 113, Park Street, W.1. Elementary school, East Greenford, for E.C. (EAST HAM).—Houses (42) and flats, Gooseley Lane; borough surveyor. (GOLDERS GREEN).—Extensions, Manor House Hospital (£300,000) for Industrial Orthopædic Society. (ISLINGTON).—Tenements, Andover Road (£43,317); Gee, Walker & Slater, Ltd. (POPLAR).—Houses (64), Janet Street; Isle of Dogs Housing Society, Ltd. (ST. MARYLEBONE).—Block of flats, Elm Tree Road; Williams & Cox. Central school; Church of England authorities.

Louth.—Houses (148); borough surveyor.

Manchester.—Houses (30), Broom Lane and Bowler Street, Levenshulme; F. Entwistle, builder, 213, Derbyshire Lane, West Stretford. Houses (89), Kingsway and Wilmslow Road, Didsbury; Longworth & Taylor, builders, Bridge Farm Estate, Didsbury.

Mansfield Woodhouse.—Houses (44), by direct labour; U.D.C. surveyor.

Market Drayton (SALOP).—Houses (37); U.D.C. surveyor.

Morecambe (LANCS).—Swimming baths and concert hall (£140,000), for Corporation.

Moreton.—R.C. schools (£10,000); W. Ellis, architect, St. Helens.

Newcastle-on-Tyne.—R.C. schools, Bentinck Road; P. J. Stienlet, architect, 5, Saville Chambers.

Norwich.—Automatic telephone exchange, Mental Hospital Estate; H.M. Office of Works.

Ore (SUSSEX).—Printing works extensions, Middle Road; Oxley & Burleigh, architects.

Oswestry.—Houses (50); borough surveyor.

Oxford.—Houses (145), Rosehill Estate; J. F. Richardson, city engineer. Extensions, East Oxford schools, including domestic subjects centre; H. F. Hurcombe, education architect.

Oxted (SURREY).—Congregational church, electrical work (£4,000); F. Lawrence, architect.

Pontefract.—Laundry extensions, Newgate, for Pontefract Laundries, Ltd.; Pennington, Hustler & Taylor, architects.

Portsmouth.—Houses (30), Hayling Avenue; Morey & Flowers. Flats, Winstanley and Newcomen Roads; E. & A. Sprigings. X-ray department, St. Mary's Hospital; city engineer.

Rawmarsh.—School (200 places), for R.C. managers; priest-in-charge.

Reading.—Houses (24), Park Lane, Tilehurst, for R. J. Haddock, Ltd.

Rochford.—Extension, Poor Law institution (£5,213); V. G. Selwood & Co., Chelmsford.

Ryton-on-Tyne.—Houses (50), for aged people; U.D.C. surveyor.

St. Albans.—Extensions, Oster House Institution (£15,151); W. A. Mewburn & Co.

St. Helens.—Cinema (£35,000), for Savoy Picture Houses (St. Helens and Ashton-in-Makerfield), Ltd.; G. E. Tonge, architect, Southport.

Salisbury.—Bazaar stores, Silver Street, for Marks & Spencer, Ltd., London.

Sanderstead.—Houses (310), Westfield Estate, Limpsfield Road; J. Gerrard & Sons, Ltd.

Sedgefield.—Houses (100) and bungalows; R.D.C. surveyor.

South Shields.—Rebuilding of Stanhope Road Senior School (£30,000); F. W. Newby, architect, 37, King Street.

Sowerby Bridge.—R.C. church, Underbank; W. Parker, builder.

Stockton-on-Tees.—Houses (60), Derwent Street and Thornton Grove; Lane, Fox & Co. Houses (58), Durham Road; G. Fordy, builder, Durham Road. Houses, Eastbourne Estate; borough engineer. School, Newham Grange, for Borough E.C.; director of education.

Tunbridge Wells.—Houses (175), Ferndale Park, for W. T. Burrows & Sons, builders, Maidstone. Reconstruction and extension of Great Hall Cinema, for the directors; secretary.

Tynemouth.—Houses (216), Ridges Estate; J. L. Beckett, borough engineer, Howard Street, North Shields.

Wakefield.—Houses (28), Flanshaw Lane; J. Firth, architect, 4, King Street. Alteration to St. Catherine's Junior School; P. Morris, architect, Town Hall.

Wantage.—Houses (40); G. Green, U.D.C. surveyor.

Wednesbury.—Factory, Bull Lane, for W. Wesson & Co., Victoria Works, Moxley (£10,000), with electrical work; staff, builders.

Welwyn Garden City.—Church of St. Francis (£7,000); incumbent.

West Bromwich.—Houses (350), Hambletts Estate; Eadie & Co., builders, 29, Waterloo Street, Wolverhampton.

Whiston.—Houses (66), Shaw Lane, for F. Gray.

Whitehaven.—Houses (98), Woodhouse; borough surveyor.

Willington (DURHAM).—Houses (60); U.D.C. surveyor.

Wolverhampton.—Houses (146), adjoining to Derby Street; H. B. Robinson, borough engineer, Town Hall. Extensions, various schools (£20,000) for E.C.